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A normal stomach, patient prone, plate anterior. (a) The splenic notch in this case somewhat exaggerated by a collection of gas in the splenic flexure; (b) pyloric defect; (c) peristaltic waves.

FIG. 3.

Carcinoma of the stomach, semi-diagrammatic. The filling defect due to the carcinoma on the greater curvature is sketched in.

FIG. 4.



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OTOLOGY, RHINOLOGY, LARYNGOLOGY,
HYGIENE, AND OTHER TOPICS OF INTEREST
TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

EDITED BY

HENRY W. CATTELL, A.M., M.D., PHILADELPHIA, U.S.A.

WITH THE COLLABORATION OF

CHAS. H. MAYO, M.D.

ROCHESTER

SIR WM. OSLER, BART., M.D., F.R.S. A. MCPHEDRAN, M.D.
OXFORD TORONTO

FRANK BILLINGS, M.D. JOHN A. WITHERSPOON, M.D.
CHICAGO NASHVILLE

JOHN G. CLARK, M.D. JAMES J. WALSH, M.D.
PHILADELPHIA NEW YORK

J. W. BALLANTYNE, M.D. JOHN HAROLD, M.D.
EDINBURGH LONDON

RICHARD KRETZ, M.D.
VIENNA

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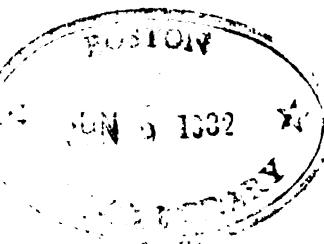
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CONTRIBUTORS TO VOLUME I

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ALLAN, WILLIAM, M.D., Charlotte, North Carolina.

BARNES, GEORGE EDWARD, B.A., M.D., Herkimer, New York.

BATTEN, GEORGE B., M.D., London.

BEARDSLEY, E. J. G., M.D., Philadelphia.

BERKELEY, WILLIAM N., A.B., PH.B., M.D., Attending Physician at the Good Samaritan Dispensary, New York City.

BEST, WILLIAM H., M.D., Assistant Visiting Physician, Department of Cutaneous Diseases and Syphilis, Kings County Hospital; Attending Physician, Polhemus Dispensary, Brooklyn, New York.

BRADY, WILLIAM, M.D., Elmira, New York.

BROOKS, HARLOW, M.D., Professor of Clinical Medicine, University and Bellevue Hospital Medical College; Visiting Physician to the City Hospital and to the Montefiore Home and Hospital for Chronic Diseases; Consulting Physician to the Ossining Hospital and to the Union Hospital, New York City.

CASE, JAMES T., M.D., Battle Creek, Michigan. Röntgenologist and Assistant Surgeon to the Battle Creek Sanitarium; Röntgenologist to St. Luke's Hospital, Chicago; Professor of Röntgenology, Northwestern University Medical School, Chicago.

CATTELL, HENRY W., A.M., M.D., Philadelphia.

CORNWALL, EDWARD E., M.D., Attending Physician to the Williamsburgh and Norwegian Hospitals; Consulting Physician to the Bethany Hospital, Brooklyn, New York.

CUTTER, JOHN ASHBURTON, M.D., Secretary of the West Side Physicians' Economic League, New York City.

ERICK, THEODORE A., M.D., Associate in Gynaecology in the Philadelphia Polyclinic and College for Graduates in Medicine; Associate Surgeon to the Gynaecological Hospital, Philadelphia.

GREELEY, DR. HORACE, Brooklyn, New York.

HOLDING, DR. ARTHUR F., Electrologist to Cornell Cancer Research Laboratories, General Memorial Hospital, New York City.

LAPENTA, VINCENT ANTHONY, A.M., M.D., Indianapolis, Indiana.

LESPINASSE, VICTOR D., M.D., Instructor Genito-Urinary Surgery, Northwestern University Medical School, Chicago.

CONTRIBUTORS TO VOLUME I

LIND, JOHN E., M.D., Government Hospital for the Insane, Washington, D. C.

OSLER, SIR WILLIAM, BT., M.D., F.R.S., Regius Professor of Medicine in the University of Oxford, England.

OUTERBRIDGE, GEORGE W., M.D., Out-Patient Surgeon and Pathologist to the Gynæcean Hospital; Assistant Gynæcologist to the Methodist Hospital; Obstetrician to the Maternity Hospital, Philadelphia.

SKILLERN, P. G., JR., M.D., Philadelphia.

WATSON, EDWARD WILLARD, M.D., Philadelphia.

WILCOX, SIDNEY F., M.D., F.A.C.S., New York.

WILSON, SAMUEL M., M.D., Philadelphia.

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Diagnosis and Treatment

REMARKS ON THE DIAGNOSIS OF POLYCYSTIC KIDNEY¹

BY SIR WILLIAM OSLER, Bt., M.D., F.R.S.

Regius Professor of Medicine in the University of Oxford

POLYCYSTIC kidney in the adult is not often recognized. It is a rare disease, but, following the law of dual coincidence, there are two cases at present under observation. In the patient before you, a woman, aged 52, sent by Dr. Hayward, of Abingdon, the diagnosis has already been made by Dr. Thompson, the house physician. She is thin, semicomatose, with purpuric spots about the face, and there is a blood-stained fluid oozing from her mouth. She is very apathetic, and it is difficult to get her to reply to questions. Interesting and, in my experience, unique features are seen on inspection of the abdomen. It is enlarged, particularly in the flanks, which bulge. But what catches the eye at once, particularly on the right side, are large, hemispherical projections between the navel and the costal borders. On the right side there is a whole series—one as large as an orange above the level of the navel, while below, extending to Poupart's ligament, are half a dozen, ranging in size from a small marble to a large walnut. On the left side they are smaller, but very distinct, particularly as the tumors descend on inspiration. It is a very remarkable pattern of abdominal tumidity—the bilateral swelling, the marked prominence of the flanks, and the hemispherical projections seen beneath the thin abdominal wall. One could not go far wrong in making the diagnosis on inspection alone of bilateral cystic kidneys. On palpation large tumors can readily be felt passing posteriorly deep into the flank, and firm, resistant cysts of various sizes project from the surface. The heart does not appear to be much enlarged, the arteries are sclerotic; the urine is very scanty, with a low specific

¹ Radcliffe Infirmary, Oxford, November 23, 1914.

gravity, and contains numerous hyaline tube casts. The history of the case is remarkable. At the fourteenth year she had the first attack of haematuria, with colic, and naturally the diagnosis was made of stone. These have occurred at intervals, sometimes of a few months, sometimes of a year or more, but she has had fairly good health, and has been able to work hard. About two years ago she had a uræmic attack. Last year, for the first time, the tumor on the right side was detected. She had felt the abdomen increasing in girth; she was at that time much stouter, and a well-known gynæcological surgeon suggested that it might be an ovarian tumor. Within the past few weeks she has had constant vomiting, has been very drowsy; a purpuric rash has broken out, and there has been slight bleeding from the gums. She has grown progressively worse, and is in a very critical condition.

[The patient died the next day, unfortunately, before a photograph was obtained of the abdomen. The post-mortem showed enormous bilateral cystic kidneys. The large cyst on the right side extended into the pelvis, and was in contact with a small pedunculated fibroid of the ovary—a very puzzling condition, I should think, for a gynæcologist. The colon was completely pushed aside and lay to the left of the kidney. As is often the case, the liver contained numerous cysts; one on the upper surface of the right lobe was larger than the fist, and was filled with a clear fluid. The heart was not enlarged, but the arteries were sclerotic.]

The other patient, a woman, aged 39, has been admitted once or twice to the surgical side, where, too, the diagnosis has been made. She is, as you see, very healthy looking, not thin, and with a good color. About ten years ago, after an aching feeling in her right side, she passed two stones, with haematuria. Since then she has had several attacks of pain, associated with passage of blood, and twice she has passed small calculi. In the intervals the urine has always been clear, and it now has a specific gravity of about 1.014, and is without albumin.

On inspection of the abdomen, the flanks bulge, more to the left than the right, but there is no special prominence in front. On the right side a large tumor occupies the flank, passes high beneath the costal border and into the epigastric region, and below reaches

to the level of the anterior superior spine. The colon can be felt passing over the tumor, the surface of which presents numerous irregular bosses or projections. On deep palpation from behind the tumor mass can be moved forward, and lifts the skin. The left side is occupied by a smaller mass with similar characters. The liver is not enlarged. The superficial arteries are palpable, the blood-pressure is only 130 mm., the apex beat cannot be felt, the heart does not appear to be large, and the aortic second is not specially accentuated. There are no other special features on examination. Her eyes are normal. The X-ray picture shows, on the right, three or four small shadows, suggestive of stones, far away from the kidney position, but quite within the limits of the tumor mass.

The pathology of polycystic kidneys has been much discussed. They are often congenital, and the tumors may be at birth of enormous size. They may be associated with other anomalies. They may be quite small at birth, as in a child with several congenital malformations, in whom both kidneys were slightly enlarged and uniformly occupied by small, just visible cysts, lined with epithelium. A very remarkable feature is the hereditary character. In 1902 I reported the case of a man, aged 39,² whose mother died of the same disease. As the subsequent history of the case has never been given, I may state that between 1902, when I saw him, and 1906, when he died of uræmia, he had many attacks of hæmaturia, and the kidneys increased greatly in size. The right kidney weighed 4370 grammes, the left kidney 5270 grammes. Three cases have been reported in one family, and a woman has been known to give birth to five children in succession with the disease. The origin of the condition has been much discussed, but the view put forward by Koester is probably correct, that in an error of development there is failure in the union of the secretory and collecting tubules, which develop separately. Very strong confirmation of this view has been recently brought forward by Forssman,³ who, studying the problem by the method of reconstruction, arrives at the conclusion that there is a failure of the union of the collecting canals, which develop from the ureter section, with the tubules of the metanephric portion. His

² *American Medicine*, vol. iii, p. 951.

³ *Ziegler's Beiträge*, vol. lvi, 1913, p. 511.

paper is illustrated by many figures showing an interruption in the development and the failure in many places of the union of the two systems. An extraordinary feature is that they may remain stationary for years, and then somewhat rapidly increase in size. This has been the case with two patients I have studied, and Dr. Alfred King, of Portland, Maine, noted within three years rapid growth. They may remain of very moderate size until middle life. The condition is consistent with robust health for many years.

Early and common symptoms are pain and hemorrhage, which lead to the diagnosis of stone. Hæmaturia may be a predominant feature for years, and it has to be borne in mind that this is one of the causes of obscure recurring hemorrhage. In 1907 I saw a lady, aged 60, who had led a life of unusual physical vigor. From childhood she had had at intervals hæmaturia, for which she had consulted numerous physicians on the continent and in this country. She had many letters about her case, in which she herself took a very intelligent interest. The bleeding had recurred at intervals of about eight months. She did not think that from her girlhood she had ever passed six months without an attack. One of her physicians—I suspect Sir William Gull—told her not to bother as it was of no more moment than nose-bleeding. I could not get from her that he used the term renal epistaxis, which has been attributed to him. When I saw her the diagnosis was simple enough—enormous bilateral tumors, with irregular surfaces, sclerotic arteries, colossal heart, with apex beat in the axilla, low specific gravity of the urine, and oncoming uræmia, of which a few weeks later she died.

Hæmaturia has been present in five out of the six cases in adults of which I have notes. The urine usually presents the features characteristic of chronic interstitial nephritis—constant low specific gravity, with a slight trace of albumin, hyaline tube casts, and there may be constantly a small number of red blood-corpuscles. Associated with these are the usual cardiovascular changes of chronic nephritis—sclerotic arteries, high tension, except in the last stages, and hypertrophy of the heart. These features have been well marked in four of the six cases. In one, as I have already mentioned, the enlargement of the heart was enormous. I do not know that I have ever felt an apex beat so powerful or so far to the left. On the other

hand, in the cases at present under observation, the cardiovascular changes are not marked, and at post-mortem in the first case the heart was not at all enlarged.

The physical signs are distinctive. No other condition gives the same picture of bilaterally enlarged kidneys with numerous elevated projections, and usually one kidney is much larger than the other. Occasionally, when unilateral, it would be difficult to distinguish the condition from hydronephrosis. In the second case the passage of calculi would suggest an ordinary hydronephrosis, but I do not think it at all likely, as the urine is clear, except during the spells of haematuria, and she has never passed pus. The type of dendritic calculus may be associated with progressive increase in the size of the kidneys and a gradual onset of chronic interstitial nephritis, with sclerotic arteries and enlarged heart. There may be no colic, extraordinarily little pyelitis, and progressive hydronephrosis may follow. In such cases the tumors are not very large, and I think it much more likely that this patient has bilateral cystic kidneys complicated with calculi.

When affecting one kidney the tumor has been mistaken for an ovarian. In rare instances, as I have already mentioned, it is unilateral, but, as a rule, both kidneys are involved, so that removal of one deprives the patient of so much valuable secreting tissue. A fatal uræmia has followed the removal of the larger of two cystic kidneys, so that surgeons now make it a rule to examine both organs before attempting to remove one.

EMETINE IN THE TREATMENT OF AMŒBIC DYSENTERY

BY WILLIAM ALLAN, M.D.

Charlotte, North Carolina

I. Introduction.	VI. Duration of Treatment.
II. Composition of Emetine.	VII. Relapses and Carriers.
III. Methods of Administration.	VIII. Action of Emetine and Encystment of Amœbe.
IV. Dosage.	
V. Immediate Clinical Results.	

I. INTRODUCTION

Piso and Marcgraf,¹ in their work on the natural history of Brazil (Amsterdam, 1648), first described the ipecacuanha plant as a remedy for dysentery. A little later it came into use in Europe under the title "Radix Antidisenterica."² Helvetius cured the Dauphin with a secret preparation composed mostly of ipecac,³ and the French Government bought the remedy and made it public in 1688. For the next two centuries ipecac was alternately praised and condemned in the treatment of dysentery, the favor in which it was held depending probably whether it was used in the amœbic or in the bacillary type. In the last few years Manson in England, Rogers in India, and Brem in Panama have again firmly established its popularity in the treatment of amœbic dysentery.

Pelletier,⁴ in 1817, extracted an active principle from powdered ipecac which he named emetine, and with Magendie recommended its use instead of the crude drug. In 1829 Lomax Bardsley⁴ used emetine successfully in dysentery, and in 1891 Tull Walsh⁵ used emetine combined with mercuric iodide, reporting 34 cases. However, as Douglas says, this knowledge passed from the ken of medical men, and it was only after amœbic dysentery had been singled out as a distinct disease and had been put on a sound etiological basis by the work of Schaudinn, Viereck, and others that Vedder⁶ undertook to investigate the effect of ipecac and emetine on amœbæ. Vedder, in 1911, showed that emetine would kill amœbæ in cultures in dilutions of 1 to 50,000 up to 1 to 200,000. Rogers,⁷ after seeing Vedder's work, applied it clinically by injecting emetine hydro-

chloride subcutaneously, and in June, 1912, announced his first results. In the two and a half years that have since elapsed numerous reports have testified to the correctness of Rogers's first impression, that emetine is practically a specific against the pathogenic entameba. (Walker⁸ has shown there is only one.)

II. COMPOSITION OF EMETINE

The alkaloid first isolated by Pelletier was, according to Low,⁹ an extract composed of mixed alkaloids, and he therefore designates the pure alkaloid as emetina. Lyons¹⁰ warns that emetin, a resinoid, is also on the market. The United States Dispensatory says that emetine is an amorphous, white powder forming crystalline salts with the halogens and with nitric acid. The hydrochloride is the salt ordinarily used, as it is the most easily soluble, requiring about 1 Cc. of water to dissolve 1 gr.

The formula of emetine hydrochloride is variously given by different authors, most of them referring to the work of Paul and Crownley.¹¹ Merck,¹² who makes his emetine according to Paul, advertises the formula $C_{30}H_{44}N_2O_4 \cdot 2HCl \cdot 2H_2O$, containing 92 per cent. of the anhydrous salt.

III. METHODS OF ADMINISTRATION

Most workers have followed Rogers in using the drug subcutaneously, and this is undoubtedly the simplest and most satisfactory method. However, in very urgent cases, Rogers¹³ has given it intravenously in $\frac{1}{2}$ - and 1-gr. doses, dissolved in 5 Cc. normal salt, with good results. Baermann and Heinemann¹⁴ recommend that treatment be started with either subcutaneous or intravenous injections, and place the maximum dose to be given intravenously at 150 mg. per 60 kg. body weight, reporting alarming symptoms when larger doses were used. Rogers himself,¹⁵ reporting on the toxicity of emetine, shows that in the rabbit the equivalent of 10 grs. per 70 kg. body weight, when injected subcutaneously, gave no symptoms, but that 4 grs. per 70 kg. body weight intravenously caused death within one minute. It would hardly seem probable that the advantage of giving emetine intravenously could compensate for the added risk.

Emetine has been frequently tried out by mouth, and keratin-coated tabloids are on the market. Unfortunately, emetine retains in some degree the local action of crude ipecac, and, according to both Low and Keng,¹⁶ the tabloids cause vomiting, while Rogers says emetine should never be used orally in serious cases. Seal¹⁷ reports the death of a six-year-old child, presumably from emetine, after $\frac{1}{4}$ gr. by mouth.

Le Blanc¹⁸ has used emetine successfully both by mouth and by colonic irrigations with one quart of 1 to 10,000 to 1 to 5000 solution. Bizard¹⁹ also has used rectal irrigations of $\frac{1}{5}$ gr. in 100 Cc. normal salt in a 23-months-old child, but Thiroux, in discussing the case, quotes Chauffard as having seen emetine irrigations following subcutaneous injections cause flux. Guillemet²⁰ and Seguin²¹ each reports a case treated by hypos and irrigations of emetine.

IV. DOSAGE

Rogers recommends that in adults 1 gr. be given every 24 hours for three or four days. In 500 cases tabulated from the literature with respect to the amount given in 24 hours, it was found that 234 received from $\frac{1}{5}$ to 1 gr., and 266 from 1 to 2 grs.; but it is impossible to tell from these clinical reports whether the larger doses were any more effective than the smaller ones.

Orticoni²² gave a case 2.5-gr. doses during a relapse after treatment with smaller doses, and it again cleared up. Maurras and Hervier²³ gave single daily injections of 2.5 grs. to a case that was later discharged clinically well. I gave repeated 2.5-gr. doses to a woman who has remained clinically well for 15 months. In another case who relapsed three months after 2-gr. doses I repeated the treatment with 2- and 3-gr. doses, and he has remained well for 12 months. In three patients Baermann and Heinemann gave single intravenous injections of 3, 4, 5, and 6 grs., respectively. The first case was amœba-free at autopsy, 17 days later. The other two recovered clinically, becoming carriers, but the cysts from these two cases failed to infect kittens. I have given 4-gr. subcutaneous injections in three cases; in the first case the dose had been increased to 2.4 grs. without effect, and the 4-gr. dose cleared up the symptoms and stools for the first time in months, but within ten days the case relapsed and daily 4-gr. doses of emetine combined with 30 grs. of ipecac by mouth

failed to have any further effect on either symptoms or amoebæ. In the other two cases single 4-gr. doses were given during treatment, and in one ipecac by mouth had to be given to rid the stools of amoebæ.²⁴

Baermann and Heinemann set 3.75 grs. as the maximum dose, and say that larger doses do not seem to be any more efficacious than 3-gr. doses. Carter²⁵ recommends $\frac{1}{2}$ -gr. doses, and states that small doses, as $\frac{1}{6}$ gr., give the entamoebæ a chance to become immune. Archibald²⁶ also mentions the possibility of making amoebæ emetine-fast by small doses. With the same idea, I last year recommended 2- to 3-gr. doses as a routine, as advocated by James²⁷ in Panama, who gives 2- to 4.5-gr. doses daily. I have seen entamoebæ disappear under this dosage, when smaller doses had had no effect. The only two cases I have seen so far which were absolutely refractory to emetine were both originally treated with ipecac by mouth (a most uncertain method, so far as dosage goes), and had possibly become immune to the drug.

However, the apparent advantage of large daily doses may be fallacious, as time seems to be a necessary factor in the action of emetine on amoebæ. Wherry²⁸ showed that emetine would kill cultural amoebæ in dilutions up to 1 to 200,000 in 23 hours, while 1 to 20,000 was not amoebacidal within one hour. Rogers, working with paramecia, has shown that emetine in dilution of 1 to 1,000,000 killed in 20 hours, but did not kill in three hours. Vedder²⁹ found that 10 mg. emetine per kilo body weight was fatal to white rats when given on two successive days. (I have not found daily doses of emetine any more depressing than intermittent doses.) With this time element in mind, Lyons³⁰ advocates small doses, repeated several times daily, and reports very good results. Nogue³¹ also says that two doses daily of $\frac{1}{2}$ gr. each are more effective than 1 gr. once a day. Rogers recommends two injections daily of $\frac{1}{2}$ gr. each, and Seal gives two injections a day of $\frac{2}{3}$ gr. each. Brau³² gives 2.5 grs. in two doses the first day, 1.75 grs. the second day, then 1.3 grs., then 1 gr. daily. Of the cases reviewed in the literature, 60 were given one daily dose, 16 were given both one and two daily doses, 71 were given two daily doses, and a few were given three and four daily injections. Whether large single daily doses are better than several smaller daily doses remains as yet undemonstrated.

The number of days on which emetine has been given during treatment has varied from 1 to 32, the average in 91 cases being 6.6 days. Seal, reporting 63 recoveries in adults, says two or three doses of $\frac{2}{3}$ gr. bi-daily generally bring results. His longest case took five days. Carter, reporting 168 cases, seems to have gotten results in three to four days as an average.

The total amount of emetine given during treatment varied from $\frac{2}{3}$ to 20 grs., the average in 100 cases being 6 grs. Seal, in 63 cases, used from 1 to 2 grs. Carter, in 120 Indians, averaged 3.5 grs., and in 39 Europeans 2 grs. to the case.

Of 87 cases reported from hospitals, the average stay in the house was 20 days, the minimum 2 days, the maximum 90 days.

Dosage in Children.—Archibald states that children are extremely tolerant toward emetine. In a child two years old he recommends $\frac{1}{6}$ gr. every 12 hours for three doses. He reports two cases, one a child aged 28 months, to whom he gave $\frac{3}{8}$ gr. every 24 hours, and during a relapse $\frac{1}{2}$ gr. in 36 hours; the second was an 8-months-old baby, to whom he gave $\frac{1}{12}$ gr. a day until the stools were clear. Barlow³³ reports giving $\frac{1}{7}$ gr. daily for two weeks to a 16-months-old, 21-pound baby with haemoglobin of 40 per cent. He further reports having under treatment a native boy, aged 7 years, weight 30 pounds, haemoglobin 5 per cent., with oedema and dilated heart from hook-worm infection, to whom he gave $\frac{1}{5}$ gr. for two days, and then $\frac{1}{3}$ gr. daily. Seal reports the recovery of four infants under one year after a couple of $\frac{1}{8}$ -gr. injections, and the recovery of a 3-year-old child after $\frac{1}{3}$ gr. Bizard reports the recovery of a 23-months-old child after rectal irrigations for four days with $\frac{1}{5}$ gr. in 100 Cc. normal salt.

V. IMMEDIATE CLINICAL RESULTS

To any one who has come through the days of treating amœbic dysentery by quinine irrigations, by appendicostomy with ice-water flushings, by irrigations with peroxide, magnesium sulphate, coal oil, or silver nitrate, and by the oral administration of 60- to 90-gr. doses of ipecac, the action of emetine seems miraculous. If emetine never effected a single permanent cure it would still be one of medicine's chief blessings because of the relief of symptoms which it affords. In from 80 to 90 per cent. of cases the griping, painful,

bloody flux, with the dead aching in the belly, back, and legs, can be stopped within a couple of days, and often after a single dose. The drug ordinarily causes no general discomfort of any sort, and only very mild irritation at the site of injection. It makes possible either continuance at, or a quick return to, work, and this is an important factor in treating mill-workers, mechanics, or negro laborers for any chronic disease. The promptness of the relief brought by emetine restores the patient's confidence after weeks of failure with the ordinary antidysenteric remedies, or after relapsing every few months for a number of years. Cheerful amoebics are unknown, for few things take the starch out of a man so quickly as a painful dysentery.

Rogers's original statement that emetine is specific has been almost universally corroborated. In tabulating from the literature 620 cases (excluding deaths), 613 are reported as cured, 7 as unimproved. The improvement in my own results since using emetine is shown in the following table:

Treatment	Total	Death	Results		Im- proved	Unim- proved
			Unknown	Cured		
Refused treatment.....	20	8	9	..	..	3
Appendicostomy.....	1	1	..	..	..	..
Normal salt irrigations.....	5	1	1	..	3	..
Quinine irrigations.....	3	..	2	1	..	..
Magnesium sulphate irrigations	11	..	..	2	7	2
Saline purging.....	1	..	1	..	..	..
Ipecac by mouth in mutton suet	3	..	..	1	1	1
Ipecac in suet and salt solution irrigations.....	3	..	1	2	..	..
Ipecac in suet and Epsom salt irrigations.....	3	..	..	..	3	..
Ipecac pills (P., D. & Co., S. & D.)	2	..	..	..	2	..
De-emeticized ipecac.....	2	..	..	..	..	2
Ipecac after Brem's method.....	6	..	..	3	2	1
Emetine, 1912-1913.....	12	..	..	11	..	1
Emetine, 1914.....	7	..	..	..	6	1
Totals.....	59	2	5	20	24	8

Unfortunately, from 10 to 20 per cent. of cases are not amenable to emetine. Baermann and Heinemann concluded within a year after the appearance of Rogers's articles that some strains of the pathogenic entamoeba are emetine-fast, as some of their cases were not affected by any of the brands of emetine on the market. Both Carter and Archibald have suggested that insufficient dosage per-

mitted the entamoeba to develop an immunity to emetine, and, as noted above, I have had two cases refractory to emetine, both of whom had been treated with ipecac before coming to me. Whether these cases were originally emetine-fast or became immune I am unable to say. The fact that relapses after emetine seem to be as easily controlled by the drug as the original attack does not favor the idea of immunity, but, so far as I know, there is at present neither experimental evidence nor sufficient clinical observation to settle this point.

In treating amoebic dysentery, rest in bed with a light diet is always best, and in severe cases, of course, these regulations become automatic. In laborers still at work, however, I find that a single daily injection at the office rapidly brings clinical recovery. I give 2-gr. doses, using the hypodermic tablets, as solutions of emetine, whether unsealed or in ampoules, turn yellow and become slightly acid, causing a good deal more local irritation. This treatment is continued until symptoms subside; if the stools still show amoebae after from three to six days, I add 20- to 30-gr. doses of ipecac by mouth, in salol-coated pills, made fresh every three days, given without water, about 4 A.M. After large doses of emetine I have seen nausea and vomiting, but no serious symptoms of collapse, and none of the symptoms of an "ipecac drunk" which were often so uncomfortable and so persistent after 50- to 80-gr. doses of the crude drug. Emetine in large doses will sometimes cause several stools (possibly from relaxation), and in one hospital case these emetine stools seemed to be very much like the stools following ipecac. (On the other hand, Nogue says there are no stools for four to eight hours after emetine.)

VI. DURATION OF TREATMENT

The long and uncertain incubation period, both in original attacks and in relapses, makes the duration of treatment problematical. Baermann and Heinemann report the sudden reappearance of amoebae in the stools with clinical relapse after 70 days in one case. In the men Walker³⁴ parasitized by feeding entamoebae, the incubation period of the dysentery ran from 20 to 95 days, with an average of 64 days. He says it may be shorter than 20 or much longer than 95 days, and quotes Vincent's cases with incubation periods of 3, 6, and 11 months; so that it is difficult to say not only when a case is cured, but, if not cured, when it will relapse, as amoebae or cysts generally reappear in

the stools some time after treatment. Relapses are reported in 25 of 49 cases from which later reports are available, and out of 97 cases reported with stool examinations only 51 were amoeba-free on discharge. Baermann and Heinemann recommend the giving of several doses of emetine at first, then every second or third day for four or five doses, then every three to four weeks for an indefinite time. Phillips³⁵ gives emetine daily for ten days or longer, then emetine or ipecac by mouth, and repeats this treatment at increasing intervals. Archibald, after the first course of emetine, gives a dose every one or two weeks for three months.

This uncertainty as to cure and to incubation period has led me to attempt to clear the stools at first, and then to tell the patient to report at once in case of relapse, when the same treatment is repeated. I see no advantage in giving emetine off and on for months, as at the beginning of an attack, when the stools contain only large trophozoites, is the opportune time for treatment. Willets³⁶ reports clearing the stools of 8 out of 19 non-dysenteric amoebias by the use of emetine, but does not state whether the amoebæ were encysted or not. Most authors have stated emphatically that emetine has no effect on cysts. Gaide and Mouzels³⁷ state that emetine does not eradicate the entamoeba, and advise that some local treatment in the gut be employed to help clear the stools. Carter advises the giving of 90-gr. doses for this purpose, but it has seemed to me that 20- to 30-gr. doses were large enough, when given in conjunction with emetine.

Waiting for the return of clinical symptoms, as an indication for further treatment, has its dangers, as shown by Musgrave's report of 50 autopsies on cases in which there were no dysenteric symptoms. In practice, however, I find it impossible to persuade patients either to continue treatment or to keep on bringing in stools for months after they have symptomatically recovered, so have to rely on clinical indications for further treatment.

VII. RELAPSES AND CARRIERS

That many relapses will occur is now becoming generally realized. But of the hundreds of cases reported during the last two and a half years only a small number were under observation more than a few days after clinical recovery, and their subsequent history is unknown. A smaller number still have been followed by stool examinations,

and it is only by following patients for years both clinically and, especially, microscopically that the true value of emetine as a specific can be determined. Half of my own cases relapse within six months to a year after treatment, but of the 12 cases treated and re-treated by me in 1912 and 1913 not one relapsed during 1914. Cases treated by Lyons, by Walker, and by Baermann and Heinemann have been followed for several years and have never relapsed, although still carrying entamoebæ. Brem's³⁸ standard, eradication of the entamoebæ to cure the patient, may have to be modified; some of these entamoebæ may have lost their pathogenic properties toward their present host. On the other hand, Seguin believes that unless both entamoebæ and cysts disappear permanently, relapse is inevitable.

In cases relapsing within short intervals after treatment the infection may have been kept active by trophozoites, some of which have escaped destruction; but in cases relapsing months after treatment it has been found that during the symptom-free interval the stools contained only cysts. As shown by Baermann and Heinemann, Walker, Vedder, and others, many cases of dysentery, after the use of emetine, become chronic carriers of cysts. Where these amoebæ lie which escape destruction is not known. Baermann and Heinemann suggest that in locations with a poor blood supply emetine fails to reach them. They also suggest that some amoebæ may be only damaged, and that after their recovery a local or general tissue immunity may cause them to encyst. Vedder suggests that it is only the entamoebæ in the lumen of the bowel which survive, and that carriers be irrigated with quinine or silver nitrate. Walker³⁹ has worked out this point of latency in balantidial dysentery in the monkey, and finds it due to three factors: First, the organisms may fail to penetrate the healthy gut and are living for the time being as commensals in its lumen; second, the chronicity of the ulcerative process may account for the lack of symptoms; and, third, there may be extensive colitis and ulceration without any dysenteric symptoms. He undertook to repeat this work with entamoebæ, but, unfortunately, none of his animals became infected. He considers it probable, however, that the latency of entamoebic dysentery is due to similar causes. It is to be hoped that this will be definitely worked out in animals, as evidence from autopsies on human carriers will take a great while to accumulate.

Very little progress has been made as yet on the problem of the control of carriers, although it is gradually becoming evident that they are the chief source of infection, either through direct contact⁴⁰ or through flies.⁴¹ Mathis⁴² classifies carriers as either convalescents who still discharge amoebæ or as healthy carriers. Working in Tonkin, he found that 8 per cent. of the natives he examined were carriers of dysentery. In Manila, Willets⁴³ found in a routine examination that 37.5 per cent. of 900 natives and 100 Americans were carrying entamoebæ, and states that a careful examination would probably raise this figure to 55 per cent. In a differential diagnosis of the encysted forms from 76 individuals he found *Entamoeba histolytica* present in 64.5 per cent. Thus from 20 per cent. to 30 per cent. of the population of Manila are seen to harbor the pathogenic entamoeba. In North Carolina I have reported entamoebæ present in 40.8 per cent. of 551 routine examinations, but no differentiation of species was made.⁴⁴ Christie⁴⁵ reports from Borneo that 30 per cent. to 40 per cent. of the entire population are amoebic dysentery carriers.

VIII. ACTION OF EMETINE AND ENCYSTMENT OF AMOEBAE

In fresh specimens the action of emetine on entamoebæ is, to all appearances, like that of quinine. Locomotion ceases, the organism becomes circular in outline, the ectoplasm bulges, and the entamoeba bursts or fades and disintegrates. In stained specimens James has shown that emetine causes a granular degeneration of the nucleus with a fibrillar disintegration of the cytoplasm, resembling the changes produced in the malarial organism after the administration of quinine. Concerning the chemistry of the destruction of entamoebæ by emetine, nothing is known.

The constant finding of cysts in the stools of carriers suggests that somewhere up the line there is a focus of active trophozoites, because only the vegetative stage is constantly productive. This vulnerable focus, whether in the lumen or gut wall, must engage our search in studying the carrier problem. That the entamoebæ are encysted in the stools shows that they have passed through an unfavorable environment. It is true that rapid asexual division through a number of generations will so tire out protoplasm that it will enter the sexual phase to rest and recuperate, but, if this were the only cause of intermissions in dysentery, the stools between attacks would

show nothing, for cysts do not produce cysts; so that, while the entamebæ may continue to thrive in some limited or sheltered region, on their way to the outside they are passing through hostile territory. The subject of unfavorable environment and the encystment of amœbæ has recently been investigated by Cropper and Drew.⁴⁶ They have demonstrated that in cultural amœbæ neither drying, starvation, acid, nor alkali will produce encystment, but that soluble bacterial products, such as choline, are necessary. They show that amœbæ encyst first where bacteria are densest, and I have recently seen this confirmed for both amœbæ and paramecia on solid media in Dr. H. P. Barret's laboratory. These observers have shown further that choline in dilute solution stimulates the reproduction of amœbæ, that 1 per cent. choline applied to amœbæ kills them instantly; and that if the strength of the choline solution be gradually increased it invariably causes encystment. (Their statement that encystment is not a part of the life-cycle of amœbæ does not hold for the parasitic entamœbæ.) Cropper and Drew have demonstrated that simply the removal of this hostile environment will not produce excystation, but that soluble ferment, either from bacteria or tissues, are necessary.

It would be very interesting to know whether very dilute solutions of emetine would produce encystment in cultural amœbæ, and whether the carrier stage is more likely to follow the use of emetine than the use of quinine or arsenic. Increased knowledge of the action of emetine on amœbæ awaits further development of the experimental work of James and of Cropper and Drew, and the gaps in our knowledge of the action of emetine on the pathogenic entamœba causing dysentery, we hope, will soon be filled in by experimental work on the cat.

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AN INFORMAL CONSIDERATION OF THE CLINICAL VALUE OF GRAPHIC METHODS IN THE STUDY OF HEART-DISEASE

BY WILLIAM N. BERKELEY, A.B., Ph.B., M.D.

Attending Physician at the Good Samaritan Dispensary, New York City

THIS paper is not addressed to specialists, but to the physician at the bedside. He it is who must finally decide the clinical value of any new method of precision in diagnosis and treatment, and his hard practical sense may in the long run be implicitly relied on to prove all things clinical and hold fast only that which is good. If he decide finally that polygraphs are only a laboratory toy, in the laboratory they will remain. But he appears to be already deciding that the polygraph is a valuable instrument, giving not only diagnostic and prognostic information of the first importance, but also many useful indications for treatment as well. It is in the hope of reinforcing this decision that the present paper has been written.

Let me first give the objections that present themselves to the use of the polygraph; then, supposing these disposed of, I will append a brief mention of the various apparatus now in use, concluding with an elementary consideration of tracings as an aid to diagnosis, prognosis, and treatment, with some easy illustrative examples of normal and pathological records.

First among the objections is the amount of trouble and time required in learning to use the instrument and read the tracings. One medical friend of mine, to whom I recently showed some of my records, sighed deeply and said: "Well, I have my opinion of a man who can seriously spend his time on such a complicated and useless business as that!" And among my post-graduate students some come bravely forward and say at once, when I begin to talk of tracings: "Doctor Berkeley, if you don't mind, please let us take that up when we come to New York again next winter!"

Yet I still maintain that the subject is not so difficult as it at first

appears to be. It takes time to learn the use of the sewing machine, or the typewriter, or to ride the bicycle; but the small initial labor of learning is not remotely commensurate with the profit and satisfaction of being able to do these things well.

I think it might be fair to say that making tracings with the ordinary stylographic instruments is about as hard as counting red blood-cells or catheterizing Eustachian tubes. While the Einthoven electrocardiograph is confessedly a specialist's instrument, requiring accurate and intimate knowledge of electrical currents, optics, and photography, anyone who can wind a clock can make my little machine "go," and, inside of a few days' practice, get very pretty results. Moreover, lacking time, he can nowadays get some tracings made for him very readily in the larger towns and cities, and nothing will then be required of him except to know how to read the records.

If the expense of the apparatus be objected to, I confess the Einthoven electrocardiograph costs quite a large sum—\$1200 to \$1500—and is not portable at that. But the others, good enough for merely clinical purposes, are much lower in price, from Uskoff's (\$150) and Jaquet's (\$125) to Mackenzie's (\$80) and my own little outfit which costs but \$12, and was devised for the special purpose of putting tracings into everybody's financial reach.

Next among the objectors come the men who explain their indifference by the counter-claim that even the specialists in cardiac tracings give themselves over to doubtful disputations about the meaning of graphic records, and that the whole subject is enveloped in a fog of uncertainty. I cannot help feeling this statement to be only an excuse for pure laziness, for the basic data of the subject are well established,—I may fairly say proved beyond the shadow of a doubt; and there is substantial unanimity in all the more important clinical deductions involved.

Finally, the men are to be met and contended with, who claim that even when the meaning of the multiple tracings is not disputed, when it is agreed that the waves *v* and waves *a* and *c* have been properly identified, when we have

—"Settled *hoti's* business,
Properly based *oun*,
Given the doctrine of the enclitic *de*,"

yet, after all, the game is not worth the candle, the trouble is not repaid by any adequate gain to the patient or his medical adviser.

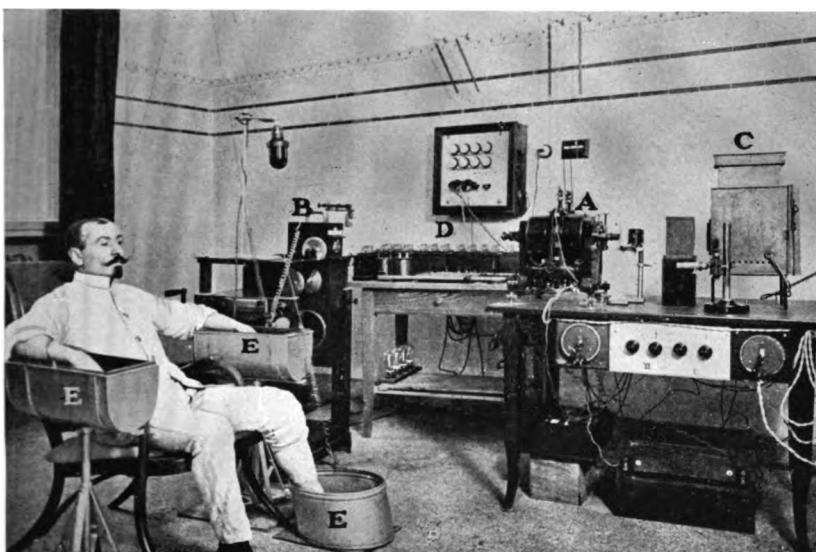
If by this claim the objector means that a typewritten diagnosis and treatment ought to come from the apparatus like the totals from a banker's adding machine, I yield his point. But diagnosis and treatment do not come to us so easily in any other field of medical art, and it is idle to require it here. There are few pathognomonic signs of disease anywhere; we must take our data "line upon line, precept upon precept, here a little and there a little," and in most cases get on as best we may by a rational balancing of probabilities. So, when we find the polygraph reinforcing and supporting some clinical suspicions, denying others, clearing up many difficult and obscure points in the action of the irregular heart, and actually showing us more about the conductivity of the cardiac muscle than we could learn by holding the organ outright in our hands and cutting it into microscopic sections, I personally do not feel disposed to any sentiment except that of thankfulness.

APPARATUS.—Coming now to the consideration of apparatus, I mention, first of all, the most important and universally valuable recording machine, the electrocardiograph. In its modern form this is a product of the genius and patience of the Dutch physiologist, Willem Einthoven, and it is really an eighth wonder of the world. I have never looked into its intricacies without thinking of the poet's lines,

—"I ponder o'er a secret
Wrung from Nature's close reserve."

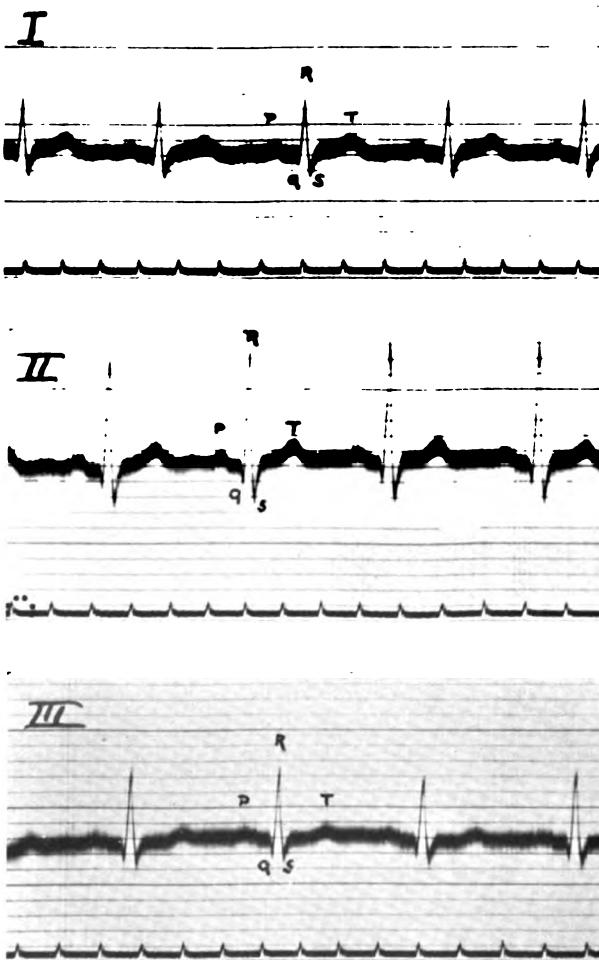
Essentially it consists of an enormously fine-drawn, silver-coated thread of quartz or glass which is used as a string galvanometer. This string, by a very complicated electrical arrangement, is made to vibrate in sympathy with the biochemical currents generated by the heart (Fig. 1). A bright light and a system of lenses throw the shadow of this oscillating filament through a slit upon a revolving photographic film, which is developed and printed in the usual way. The current from the heart is taken up in three ways—from the right arm and left arm; the right arm and left leg; the left arm and left leg. These connections are called "leads," and are designated in the order named as I, II, and III. Fig. 2 shows a normal human record, each lead being, as usual, designated by a numeral in the upper left-

FIG. 1.



Complete station after Hoffman. *A*, string galvanometer; *B*, receiving apparatus; *C*, illuminating apparatus; *D*, rheostats; *E*, *E*, electric leads.

FIG. 2.



Normal electrocardiogram. (This tracing was kindly loaned me for publication by Dr. T. Stuart Hart, of New York.) I, II, and III are the records made with the three "leads" described in the text; *P* is the auricular systole; *Q, R, S*, and *T* the ventricular systole."

hand corner of the tracing. A notched line below marks the time. Each tracing is evidently a symmetrical serial, and each wave or group of waves marks an event in the cardiac cycle. The waves are usually designated by arbitrarily chosen capital letters. *P* represents the auricular systole; *Q*, *R*, *S*, and *T*, the ventricular systole. The very fine saw-tooth oscillations of the shadow are thought to be caused by cutaneous currents or by trembling of the voluntary muscles. The "saw-teeth" should be disregarded in reading the tracing.

This apparatus has the advantage over the stylographic instruments of being applicable to all patients without exception, whereas only about eighty per cent. of all cardiac cases have a cervical venous pulse which is accessible to the rubber diaphragm of a tambour. The electrocardiograph is also an instrument of the highest scientific precision, and it has cleared up a number of fine points which had been only guessed at with the polygraph. The great disadvantage is its high cost, both in original purchase and in upkeep. The apparatus is not only expensive, but installation of it is difficult, and the operation of it requires expert care. Its working is much disturbed by vibration of the earth in its neighborhood (blasting, passing trains, heavy trolley cars and drays), and, not being portable, it is useful mainly for hospital work and for ambulant cases. Its availability is comparable to that of X-ray photographic apparatus, and the best way for the busy general practitioner to make use of it is to send his patients to the nearest hospital or laboratory where the services of an electrocardiographic specialist are to be commanded. The ordinary charges for a complete series of cardiograms should not be more than for a set of X-ray plates made to show a renal stone or a fractured bone, and they will be well worth the expense, as I hope to show. In New York to-day there are half a dozen Einthoven instruments, and one or more are installed in Baltimore, Philadelphia, and other eastern cities of this country. Their popularity is increasing. The most useful books in English on the study of electrocardiography are those by Dr. Thomas Lewis, of London, and an article of great value for beginners is that by W. B. James and H. B. Williams in the *American Journal of the Medical Sciences*, 1910.

Among the numerous stylographic apparatus may be mentioned the Jaquet sphygmocardiograph (smoked paper; time-mark and two or three tracings), the Mackenzie ink polygraph (time-mark and two

tracings), and Uskoff's sphygmotonometer (smoked paper; writes time-mark, blood-pressure, brachial pulse, and one other tracing). These are well described in various places in the literature, and a good descriptive circular and price-list may be had of the dealers. These machines cost (duty paid) from \$80 up to \$150 or more. The records are to be made upon special glazed paper, and, for those that use the smoke film, smoking lamps and smoking drums are also sold.

FIG. 3.

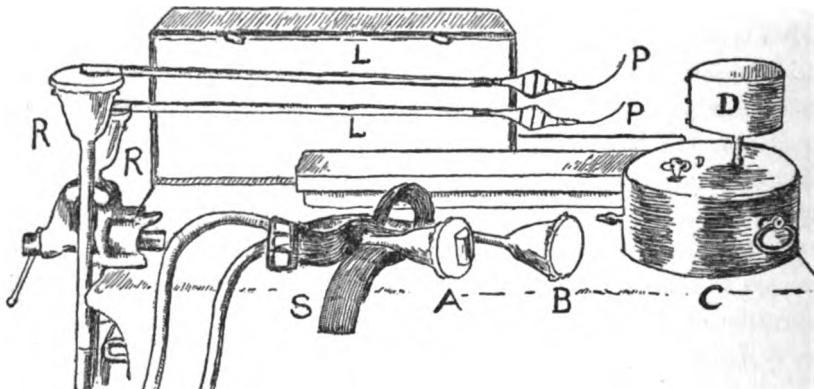


FIG. 3.—Dr. Berkeley's Polygraph, Improved, with Parts Assembled.

DIRECTIONS FOR USE.

Set up the Recorder as shown. Use talcum on the ends of the rubber tubes. Wind the clock, C. Put the drum, D, on the revolving shaft. The drum is started and stopped by a touch of the finger. The patient reclines, and breathes lightly. Lay the wooden pad of Funnel A lengthwise on the left carotid artery and buckle the strap, S, snugly over the larynx. Hold Funnel B over the right internal jugular vein just above the clavicle, and external to the sternal insertion of the sternomastoid. The Funnels, R, R, must be vertical, one 2 cm. above the other. The levers, L, L, must be horizontal, and the tracing points, P, P, in one vertical line. See that all the connections are airtight.

Smoke a slip of smooth white paper 21 x 4 cm. evenly and completely in the flame of a cheap candle. Apply the slip accurately to the drum by the pins. Imperfect tracings are due to badly applied slips. Approach the stopped drum carefully to the tracing points till they make a smooth alignment line on the smoked paper. Then start the drum. Withdraw it at the end of one revolution. Take off the slip, fix in weak alcoholic solution of white shellac, dry in air 2 minutes. To determine the time, note only that on the paper 1 cm. equals 1 sec., and 1 mm. equals 1-10th of a sec. For Cardiograms hold Funnel A on the apex-beat of the heart. For Respiratory Curves hold Funnel B on the pit of the stomach.

My own instrument had its reason for being solely in my desire to simplify the process and reduce the cost of making multiple tracings. I hoped thereby to popularize the study of heart-disease by graphic methods, and put it into the power of all the younger and more leisureed members of the profession to do the work for themselves.

The original Berkeley machine was described in the *Medical Record*, January 22, 1910. Subsequent experience and observation made it possible to improve the apparatus in many ways, and the adjacent drawing (Fig. 3) shows most of the changes. They are not radical, but results are better and the technic is simplified. By reference to the accompanying drawing, the reader will notice that, as compared with the first plans, all the funnels have been shortened. This puts the levers on a more convenient level with the drum, and makes the application of the receiving funnels to the patient's neck more satisfactory. The drum itself is now made of seasoned maple, and is accurately turned to a circumference of 20 cm. It does not seem to warp after many months' constant use in all kinds of weather. The levers are now only half their former weight, and all the metallic parts of the instrument, including the recording points, are lacquered or nickelled. The movement of the clockwork has been also improved, and is now smooth and uniform enough for every practical purpose. The directions that go with the apparatus are given under the cut.

One objection some of my friends have raised is that the apparatus has no time-marker, but they seem to ignore the simple fact that when the clock is wound up (to the point noted on the bottom of each case) the drum makes one complete revolution in 20 seconds exactly. Now, as the drum is just 20 cm. in circumference, it follows that on the smoked slip one centimetre must equal one second, and one millimetre one-tenth of a second. To compute the time, therefore, absolutely nothing is needed except a tape-measure or rule graduated to millimetres.¹

The average performance of the instrument is shown by the tracings in this article. They are reproduced entirely without retouching. For additional illustrations the reader is also referred to *Merck's Archives*, September, 1910.

While the principles on which my instrument depends are simple enough to be understood by a first-year medical student, a certain degree of practice is necessary. It should not, therefore, be alleged as a permanent objection to the polygraph that the operator cannot get pleasing results with the first smoked slip; a few days' practice (best

¹ Not applicable to some of the tracings of this article, which have been reduced in the plates.

on a docile patient who has a large venous pulse) will be quite sufficient to give the necessary facility.

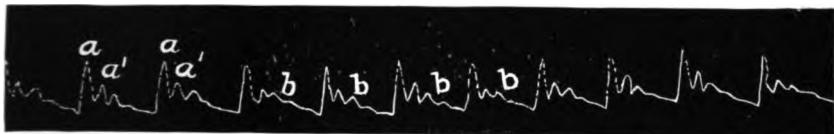
TRACINGS AS A CLINICAL GUIDE IN CARDIAC PRACTICE.—There is no great exaggeration in saying that for the study and treatment of cardiac disease in a modern way graphic methods are as helpful as a urinary analysis in diabetes or a blood examination in pernicious anaemia. The better and more ambitious of undergraduates studying with me have apparently found no drudgery in learning the new lessons, and declare themselves amply rewarded for every hour of study. The following informal account will involve no special difficulties for the physician who remembers the physiology of the cardiac cycle, and will, I hope, acquit me of the accusation of making unprovable assertions.

Normal Double Tracings.—The polygraph may be made to write three or even four simultaneous records—artery, respiratory curve, vein, liver—but, for general clinical needs, it writes *two*—one of the arterial, one of the venous pulse. The arterial tracing may be taken from the apex-beat, from the common carotid in the neck, or from the radial pulse; the venous tracing from the right internal jugular just above the inner end of the clavicle. All the instruments have a device of some kind for recording time in fractions of a second. In my instrument the time is uniform—an average speed adapted to the average case—and is computed simply by applying a millimetre rule to the slip, as already explained.

When the radial pulse is used for arterial records—as in most of the published works of James Mackenzie—an allowance of a fraction of a second must be made in order to synchronize the radial pulse with the jugular. When the carotid is used, the times of the carotid and jugular pulses are so nearly the same that no allowance is required.

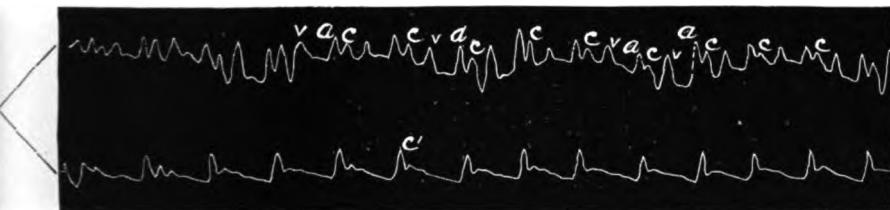
Although the normal double tracing looks mysterious at first glance, only a moment's attention is necessary in order to understand it. The arterial tracing (Fig. 4) consists of a regular succession of waves, each with two main crests. The first crest is the pulse, which, through a defect of the lever (its inertia), is sometimes doubled (a' , a). The second is the dicrotic or recoil wave, b , b . The unit of the venous tracing (upper line of Fig. 5) normally consists of three waves. In order to identify these, one takes a small draughtsman's compasses and measures the distance from the vertical mark where

FIG. 4.



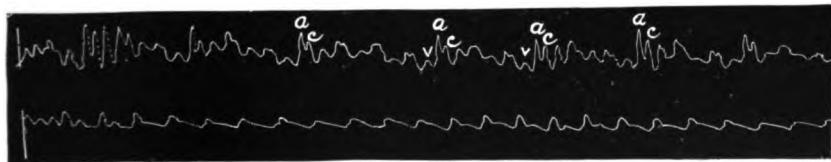
Normal arterial tracing, from the carotid artery. In each serial element the first crest (the pulse wave) is doubled by the inertia of the lever. The double crest, a , a' , is the pulse wave; the single crest, b , is the recoil wave, or dicrotic wave.

FIG. 5.



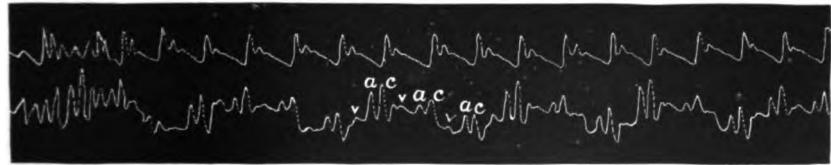
Normal venous and arterial tracing, made with the author's polygraph. Reproduced without retouching. Alignment lines to the left represent simultaneous times. Jugular above, carotid below.

FIG. 6.



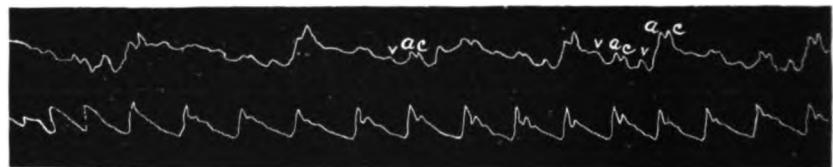
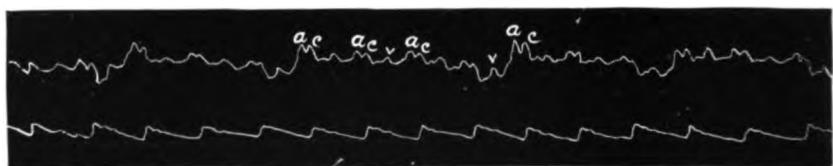
Boy of 15 years. Well-compensated mitral regurgitation. Heart beating around 90; $a-a$ interval, $1\frac{1}{2}$ mm. (Jugular above, carotid below.) Prognosis favorable.

FIG. 7.



Youth of 22 years. Double mitral murmur, durations and cause not determinable; compensation good until subjective palpitation developed a few days ago. Pulse 64 and regular. The $a-c$ interval is less than 2 mm., indicating that the muscular conductivity is good. (Jugular below.) Prognosis favorable.

FIG. 8.



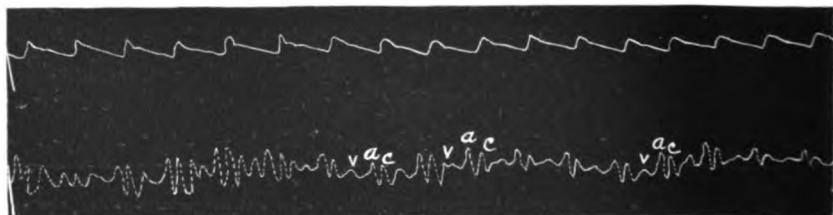
Enormously fat man of 64 years. Advanced emphysema, great dyspnoea, and complaint of intense pain over sternum. Aortic disease and arteriofibrosis suspected, but left apex palpates in the usual place, murmurs are systolic only, and tracing shows a pulse of 60 per minute, and a normal a-c interval. (Jugular above. Tracings made at intervals of half an hour. Alignment lines omitted through mistake of engraver.)

FIG. 9.



Dr. P—, 42 years old. Old valve lesions, arteriosclerosis and high tension; a-c interval (on original, of course, not on this reduction) over 2 mm., though pulse is beating around 90. Tracing suggests that the myocardial conductivity is damaged. (A week later this patient's blood-pressure was 230 mm. systolic; 2 weeks before, 240 mm. systolic.)

FIG. 10.



Man, 43 years old. Systolic murmur. Slight left hypertrophy; attacks of pain much like angina. a-c interval normal, less than 2 mm.

the arterial tracing (lower line) begins (this is called the alignment line) to any convenient arterial pulse wave, say to c' . Now, without changing the compasses, lay off this distance on the venous tracing. Start on the venous alignment line, and note on what venous wave the other leg of the compasses chances to fall. In this case it will fall at c . This wave, c , is—or for all clinical purposes may be considered to be—the wave made in the vein by the impact of the arterial pulse upon the venous column. In English books it is universally called the c or *carotid wave*. Next before it is to be found the a , or *auricular wave*, made by the back-lash of the contracting auricle at the beginning of systole. And just before this comes the v , or *ventricular wave*, as Mackenzie calls it, which is made by the filling up of the vein in diastole,—*i.e.*, between the beats of the heart. When one v , a , c cycle is identified, all the others may generally be recognized at once without further measurements. The venous tracing, as a whole, generally undulates a little (see Figs. 8 and 10) with the breathing, and the respiration rate is often recorded very accurately in this way. Sometimes there is no distinct undulation of the venous line, but the v , a , c waves are much higher and more distinct (see Figs. 7 and 8) at one phase of respiration than another. This variation in amplitude has no effect upon the wave-lengths, which are strictly fixed by the action of the heart.

Certain occasional anomalies in the venous tracing require brief mention. Instead of a single wave, the v wave may be doubled. The reason is not apparent why this should be so, but the doubling is of no clinical consequence. The a wave also may show an accessory undulation. These differences rarely cause any special confusion when one is accustomed to the language of the curves in general. Sometimes the carotid shock is not shown in the venous line and the waves are but two— v , a ; v , a —but the compasses and the guiding arterial line will always save one from error.

A particularly vexatious accident sometimes happens with the venous tambour. In cases where the venous pulse is rather hard to get, and the vein tambour is experimentally pushed too far into the neck, a pulsation is taken up which appears to be a venous, but is really an inverted arterial pulse, produced by the anonyma or one of its branches. The appearances are very deceptive, and inverted arterial tracings are now and then actually published by careless authors as

venous tracings. But no one need make the mistake if he will only use the compasses carefully; for the base (that is, the left-hand point of beginning) of every arterial wave corresponds by measurement not to the base but the *crest* of the supposed *c* wave in the venous line.

Measurement of the Conducting Power of the Cardiac Muscle.—So much has been written about the value of the polygraph in explaining the irregularities of the heart's action that I think many physicians do not really know of what immense value the double tracing is in showing up the conductivity of the myocardium, for thus we can often get an inside view of the nutritional status of the heart muscle. This condition is really the *crux* on which all prognosis and treatment depend; and the murmurs made by crumpled valves, in comparison with such information as this, are of relatively small importance.

To find the conduction-time with the electrocardiogram is a very simple matter. Take the compasses, stretch them from the beginning of *P* to the beginning of *R*, and then lay off this distance on the time-line. Remember that the normal conduction-time is 0.15 second ("one and a half tenths," as we say in our clinic), or, more accurately, between 0.12 and 0.18 second. Conduction-times of over two-tenths of a second (0.2 second) practically always indicate an embarrassed muscle, and intervals near three-tenths or over it indicate impending block. Naturally, before drawing such conclusion, one will make repeated measurements on all parts of the slip, average them up, and assure himself that the clockwork is in order.

This *P-R* interval on the electrocardiogram is represented in the polygraphic tracing by the interval between the beginning of the *a* and the beginning of the *c* wave; for, if we stop to think, it will be quite evident that the auricular wave corresponds to the first contraction of the auricle, and that the carotid wave comes just after the completed contraction of the ventricle. In the polygraphic records requiring a special time-marker the compasses must first be applied to the points designated, and then to the time-line. On the slips from my instrument we apply a millimetre rule, and often speak of one-tenth-second intervals simply as "millimetres" (see following illustrations).

The clinical significance of the conduction-time, or *a-c* interval, as it is more often called, may be set forth in the best and simplest

way by showing and explaining a few illustrative cases. This I have attempted to do in Figs. 6, 7, 8, 9, and 10, where the respective legends throw all necessary light upon the nature of each case.

In Fig. 9 the tracing is shown from a case of particular interest. The patient was himself a physician, whom I was asked to see in consultation with several other medical men. The general condition of the circulation, and particularly the alarmingly large *a-c* interval (more than 0.25 of a second), led me to give an unfavorable prognosis. My view was not concurred in by the other medical advisers, and the patient was taken elsewhere, where his friends received a much more reassuring opinion. He did not, however, survive more than three or four months.

Fig. 10 was taken from a business man of 43 years, who had a slight valvular disease (mitral insufficiency), accompanied by alarming anginoid attacks. During these attacks he would be seized with very severe precordial pain radiating down the left arm; his face would be pale and drawn, his breathing difficult, and a cold sweat would start upon his face. These attacks came several times a week, irrespective of exercise, and lasted from three to five minutes. There was absolutely no history of a neurotic constitution. The patient had a short, thick neck, and the tracing was made with difficulty; but the *a-c* interval was reassuring—less than two millimetres—and careful administration of strophanthus, with rest, diet, and proper exercise, greatly improved his health, and had almost abolished the attacks when he was last heard from.

Extrasystoles.—This curious phenomenon has in recent years received an immense amount of attention. The usual explanation is that the regular biochemical heart-stimulus, starting at the junction of the superior vena cava with the right auricle (sino-auricular node, “pacemaker” of English writers) and proceeding thence through the auricles to the ventricles, is interrupted by another stimulus, starting at a different time and in another part of the cardiac muscle. This premature contraction, coming out of turn, leaves the heart muscle momentarily exhausted and “refractory,” as a rule (there are some “interpolated extrasystoles”), to the next regular contractile impulse. The next regular beat, therefore, falls out, and there is a long pause.

Extrasystoles are believed to start in certain ectopic remnants of

the fetal sinus venosus, which survive in the auricular and ventricular walls. It is one of the wonderful achievements of the electrocardiograph that by its means extrasystoles may be described and classified definitely as to their anatomical origin. A polygraph, however, is ample for clinical purposes. Many cases of simple extrasystole may be recognized by the finger on the pulse or the stethoscope on the heart (two beats followed by a pause, "intermittence" of old writers); but the pulse also intermits in the earliest stages of block (as explained below), and in many patients the irregularity is so tumultuous that nothing but a tracing will suffice to discriminate extrasystoles from several other conditions of much greater gravity.

Extrasystoles often come and go in otherwise apparently healthy hearts. But they are much more frequent in advancing years—from forty on. They are commonly stated to be more frequent when the patient reclines, but, so far as my personal experience goes, this is an error, the very reverse being usually the case. Extrasystoles are rare in young children, but not unknown; the adjacent tracing (Fig. 11, artery only) is taken from a little girl of ten, in whom the premature beat appeared four or five times a minute.

Extrasystoles cut up all kinds of capers: they may be inconstant, or accurately alternate with the regular beats for days at a time. They also occur consecutively—in groups of twos, threes, and fours. Fig. 12 is from a young man who in the reclining position gave tracings as indicated, but who when standing had a regular pulse of 150—evidently a "storm" of extrasystoles, drowning the normal rhythm, and corresponding in every regard to *paroxysmal tachycardia*. A study of this patient and of other similar cases convinced me years ago—long before the galvanometer had scientifically unravelled the matter and proved my suspicions correct—that this is the proper explanation of nearly all cases of paroxysmal tachycardia, namely, that a fast extrasystolic rhythm has in these patients completely supplanted the sino-auricular rhythm.

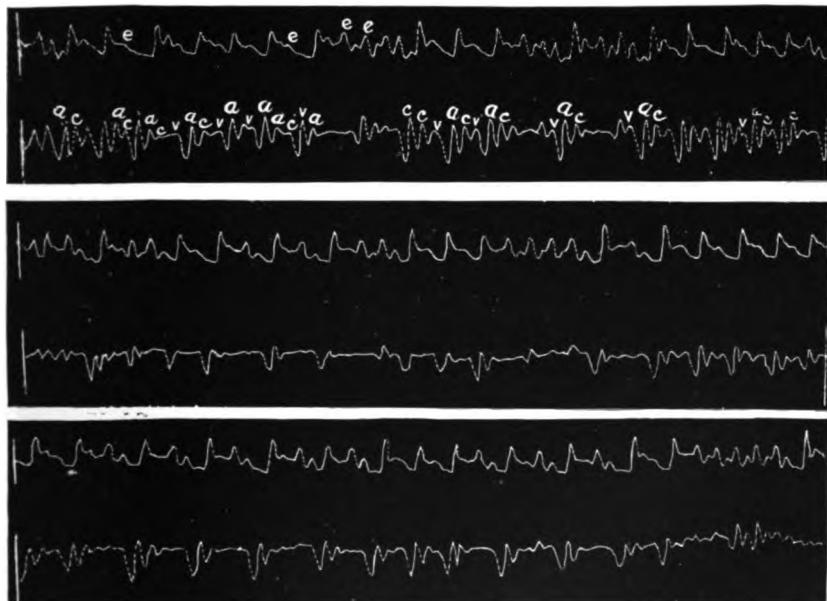
Paroxysmal tachycardia is a curious and interesting study upon which a small volume might be written; but let the single remark suffice, that it cannot be distinguished from the fast pulse of exercise, of fright, of exophthalmic goitre, or of the febrile toxæmias, except by a double tracing or a cardiogram. In the double tracing the *v, a, c* sequence in the jugular line is abolished, and is replaced by a *single*

FIG. 11.



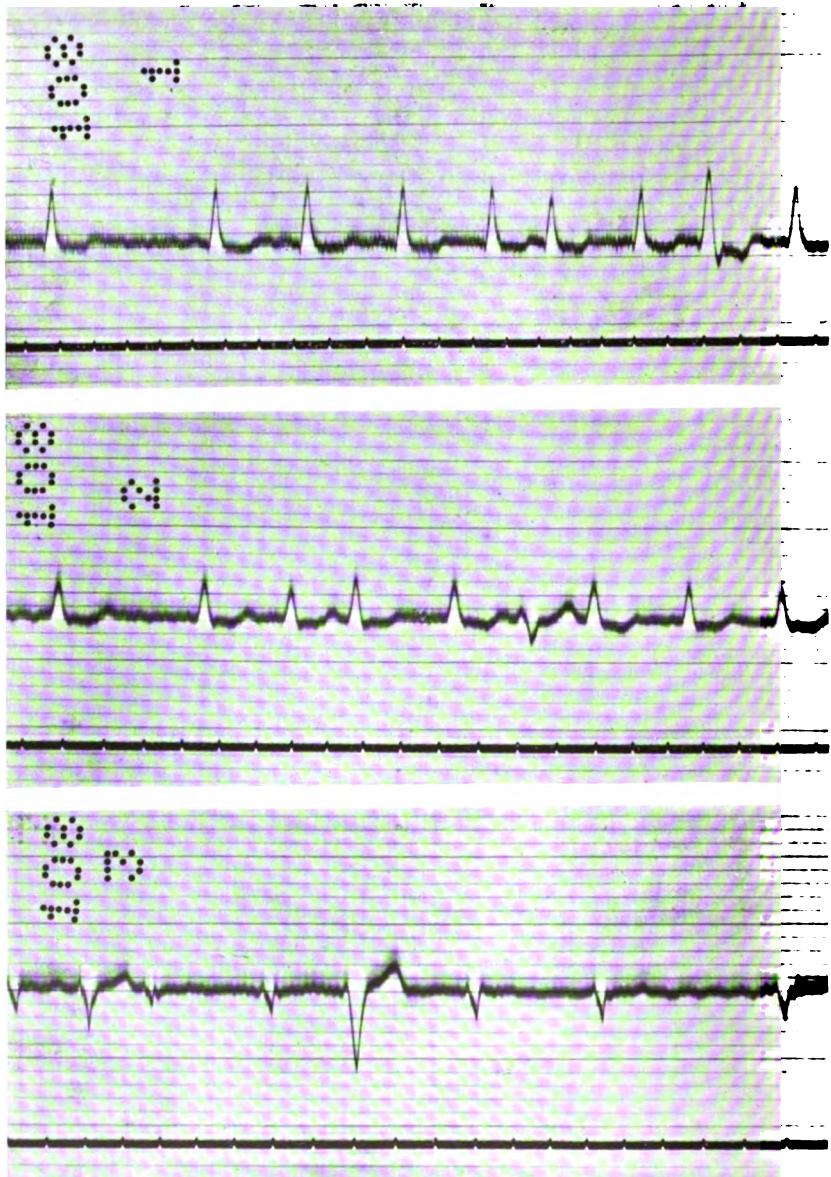
Arterial tracing from a little girl of 10. The child was restless, but a premature contraction can be clearly made out at the point marked e.

FIG. 12.



Man, 28 years. Double mitral lesion of some years' standing. In the erect position his pulse is 150, and to the finger shows no perceptible irregularity. When lying his pulse drops to 70 or 80 with frequent extrasystoles. (Tracings at intervals of several days; jugular below in all.)

FIG. 13.



Electrocardiogram, case of auricular fibrillation in a man of 45 years. Patient had a very large heart and multiple murmurs. (Tracing kindly made for me by Dr. H. B. Williams, New York.)

wave, synchronous with the carotid wave. In this regard it somewhat resembles the picture of fibrillation (see below), but no one could confuse these two for any length of time; for the pulse of paroxysmal tachycardia is very rapid and almost perfectly regular.

As to the prognosis of extrasystoles, they are generally innocuous. When they present themselves in a man of middle age, with a normal percussion area and no murmurs, he is, in my opinion, still a first-class insurance risk, and should be accepted without hesitation. The diagnosis should, however, be established in every case by a double tracing, and the tracing should be sent in as a routine practice by the medical examiner with the other data of the application blank.

Extrasystoles usually require no treatment. They come and go like the wind, which bloweth where it listeth. Hypodermics of atropine sulphate may be tried when the patient is rendered nervous or apprehensive by the subjective discomfort they sometimes entail. The essential cause of their coming and going is entirely unknown. The coupled beat after digitalis overdosage is a special form of extrasystole which has peculiar clinical meaning, and will be mentioned again.

Auricular Fibrillation.—Clinically this is the most important of all the irregularities of the heart, and in most instances it cannot be understood or successfully treated without the graphic records. This is specially the case in mitral stenosis, where extrasystoles are often tumultuous and frequent, simulating perfectly the irregularity of auricular fibrillation, and quite indistinguishable from it without mechanical aids.

Thomas Lewis describes the condition in this way: "Fibrillation of the auricles is a state in which coördinate contraction has ceased in both these heart chambers, and in which the individual strands of the musculature exhibit independent and constant twitching movements." These movements do not, however, drive blood into the ventricles; they only serve to upset the normal ventricular rhythm, and make its contractions "haphazard"—often rapid, nearly always irregular. The electrocardiogram (Fig. 13) shows this irregularity. It shows also that the ventricle in these cases is apt to be driven not only by relatively normal impulses from above, but also by extrasystoles of ventricular origin. These are indicated by the anomalous ventricular curves appearing at long intervals. It will be noted that there are

no normal *P* waves, but that abnormal undulations of the thread (auricular twitchings) occur from time to time, where *P* waves should appear.

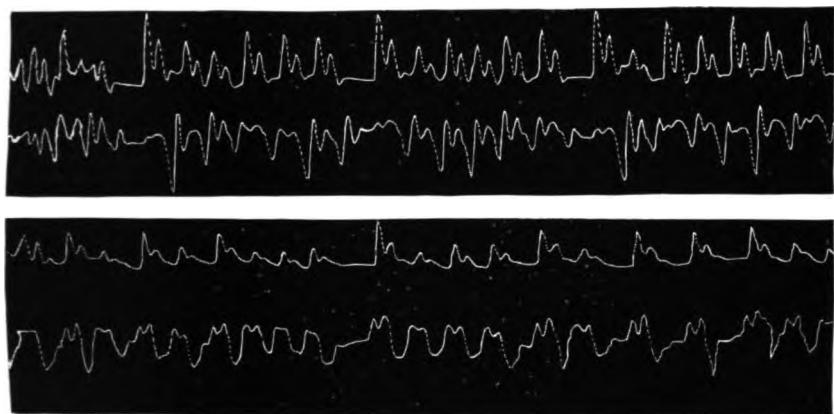
In Fig. 14 is a polygraphic tracing of the same phenomenon in another patient. It will be observed that the jugular pulse here no longer shows *v, a, c* cycles at all; only *systolic waves* are seen (coincident with the carotid), together with an occasional coupled beat, of which only the first appears on the arterial line. The second beat of the couple is a ventricular extrasystole, and of this I shall say something more later on.

Auricular fibrillation is usually a condition of some gravity. It is associated with valvular disease and myocardial damage. Once well developed it usually persists. Sometimes, apparently, a patient has the good fortune to recover his sinus rhythm again, but these cases seem to grow rarer as I become more proficient in reading tracings. Paroxysmal fibrillation has been reported.

The fibrillating heart is the one which has created the reputation of digitalis in cardiac failure. The effect of the drug upon this condition in many cases is little short of a miracle. It is one of the great contributions of Dr. James Mackenzie to modern practice that he first discriminated the precise cardiac lesion with which digitalis stands in this relation. The *rationale* appears to be in part that digitalis lessens the conductivity of the bundle of His (see below), giving the ventricle, in this way, more time to fill up and rest between beats. But this explanation is evidently not a complete one. The matter is discussed at length and with great clearness and interest in Mackenzie's own writings, to which the reader is referred.

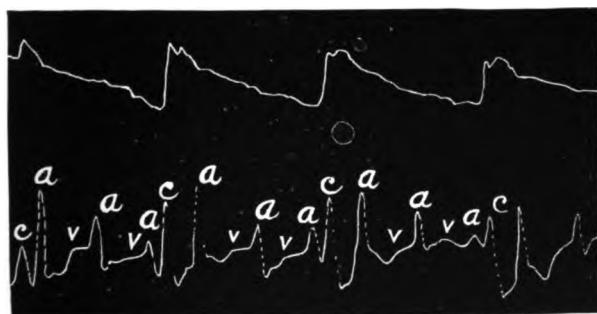
In the multitude of additional facts touching upon this part of my subject there is only space for the mention of coupled beats once more. When digitalis has been pushed in cases of auricular fibrillation, and the condition of the patient has considerably improved, the irregularity of the heart does not disappear; on the contrary, it becomes more marked, and there become evident certain groups of double beats which have a characteristic in common, namely, the second beat of the couple appears imperfectly or not at all in the radial and carotid line, while both are well marked in the venous one. As digitalis acts further, there is a further slowing of the heart, with increase in the number of couples. This is called "digitalis coupling." The

FIG. 14.



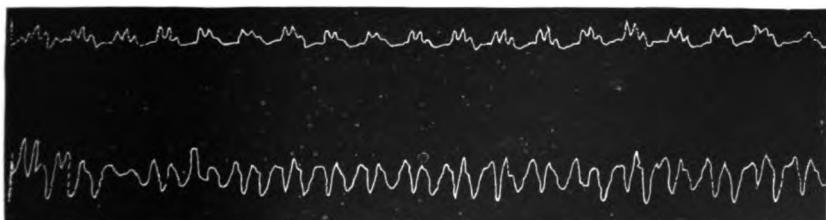
Man, 37 years old. Rheumatic lesion of many years' duration. Fibrillation, the tracings showing at intervals ventricular coupling, the second beat of each couple being very large on the venous line, and small or absent on the arterial. (Tracings made at interval of some days. Jugular below.) This patient had received for a long while large doses of digitalis. (Alignment lines omitted through error of engraver.)

FIG. 15.



Man of 76. Block. Ventricles beating regularly, 24 to the minute; auricles (lower line) also beating regularly, 72 to the minute. Patient had most of the symptoms of the Stokes-Adams syndrome. (Patient seen with Dr. W. L. Baner, of New York, to whom I am indebted for permission to publish this tracing. The case will be reported fully by Dr. Baner elsewhere.)

FIG. 16.



Woman, 42 years. Valvular disease, dilatation, general dropsy. Peculiar pulsation in left side of neck,—twice for every apex beat. Polygraph shows it to be a transmitted arterial wave, with exaggerated recoil. Upper line, right carotid; lower line taken from the anomalous area of pulsation.

second beat is shown by the galvanometer to be a ventricular extrasystole. Coupling is a danger-signal—an indication that the patient's extreme limit of tolerance for digitalis has been reached.

So far as my personal experience with digitalis has been concerned, I have had occasion many times to confirm Mackenzie's views. There is abundant evidence nowadays to show that the indication for digitalis is not merely a dilated heart, but a dilated, *fibrillating* heart. And when digitalis is indicated the fresh tincture of good English leaves works perfectly, and is much to be preferred to all the host of proprietary hypodermics, which are generally used in the wrong cases and too often produce little but multiple abscesses.

Of the rarer anomalies of cardiac action, like *auricular flutter*, where the auricle beats 250 or 300 a minute, and *sino-auricular block*, where there are sudden vagal changes in a regular rate, it would perhaps be best not to speak at confusing length in an informal paper, and I conclude with some comments on the more important features of *auriculo-ventricular block*.

To understand blocking it is not necessary to go to a terrifying depth into the physiology of the heart. All one has to remember is that the contractile wave, starting at the top of the right auricle and running thence down both auricles, reaches the ventricles through one special bundle of muscle in the auriculo-ventricular region. This bundle is called the bundle of His. When the bundle of His is inflamed, degenerated, pressed upon by a gumma or other tumor, or even, as sometimes happens, only temporarily crippled by acute toxæmias, it loses to a greater or less degree its conductivity. Instead of the contraction wave getting through the heart in 0.12 or 0.16 or 0.18 second, the time is prolonged to 0.20 or 0.25, or even more than 0.30. This prolongation of the *a-c* interval, of which we have already spoken at some length, is the first stage of blocking. Next comes the stage of "dropped beats," "partial block," where, after a certain number of heart-beats, the His bundle is momentarily exhausted and the ventricular beat falls out. In its earliest stage this is a form of "intermittence" which without a tracing might perhaps be confused with extrasystoles—a dangerous mistake.

Sometimes a relatively regular partial block occurs and the ventricle beats with every second, third, or fourth auricular beat. In Fig. 15 the ventricle beats with every third auricular beat. Partial block,

however, is generally an unstable condition, and tends often to "complete block" (Stokes-Adams's disease), in which the auricles beat with one rhythm, and the ventricles with another entirely different.

While a blocked pulse may evidently, in the nature of the conditions, be fast or slow, regular or irregular, it is apt to be extremely slow and quite regular (*bradycardia*). Of course, bradycardia may be physiological, with a clean-cut *v, a, c* jugular sequence for every arterial beat; but it ought always to be viewed with suspicion, and the patient carefully examined by graphic methods.

This is essential not only from the point of view of the man who wants to get his diagnosis correctly, but for purposes of treatment also; for digitalis is a dangerous drug in heart-block, and should be used with extreme circumspection, if at all.

It not infrequently happens that in suspected blocking of the ventricles one may note in a good light, by the naked eye, the venous pulsations, and by controlling them with the finger on the apex-beat or the carotid form a shrewd estimate of what is going forward, but this is mere guesswork, subject to many sources of error, and always to be verified with an instrument. One of the commonest errors among inexperienced students is the mistaking for a multiple venous pulse the one or more recoil waves of a stiff carotid. The tracing in Fig. 16 was from a patient of this kind in whom block was suspected. The double tracing showed the real state of affairs at once.

PHYSICAL AND ELECTRICAL THERAPEUTICS IN GENERAL PRACTICE

BY GEORGE B. BATTEEN, M.D.

London

As I have used these methods for over seventeen years, I thought that the results of my experience might be interesting and, I hope, useful to others who, like myself, are engaged in the general practice of medicine. I cannot to-day attempt to review the whole subject of physical and electrical therapeutics, which, of course, includes balneotherapy, hydrotherapy, ranging from the giving of an enema to applying a Nauheim bath, and also includes massage, breathing exercises, etc. I intend, therefore, to confine myself to the same limits as I did in a paper on "Heat, Light, X-ray Electrotherapeutics," which I read before the British Electrotherapeutic Society in March, 1903, just eleven years ago. This list made for that paper will show you how I then subdivided it, and I intend more or less to follow the same classification now. I have a new list here for to-day.

I will try to be as short and as practical as I can, and will demonstrate the methods as far as possible.

1. *Cold*, produced by Leiter's tubes, ice-caps, and ethyl chloride spray, is, of course, useful for certain inflammations, headaches, and neuralgias.

Intense cold, produced by solid carbonic oxide, has, during the last few years, been employed most successfully for a variety of complaints. I had some X-ray warts on my hand treated and cured by CO₂, on the first day it was demonstrated in England by Dr. Reg. Morton. The method I use is a very simple one, some of which was suggested by our friend, Dr. H. G. Clitherow. Take a piece of thin blotting-paper, roll it up in a cylinder over a rod or test-tube, pinch together one end of it and hold it over opening of the liquid CO₂ bottle; when the snow has collected, unroll blotting-paper and drop snow into an ordinary penny funnel with a spout of appropriate size, ram this tight into the spout with a weighted wire, then push it out

the reverse way, and we have a conical rod of solid CO₂; cut or rasp this into the size wanted and apply to part to be treated for proper length of time and with proper pressure.

This substance is most successfully used for treatment of nævi, moles, warts, lupus, rodent ulcer, also of trachoma and pannus. It is about the only successful method of removing warts and excrescences that arise or have arisen on the hands of X-ray workers. It is necessary to freeze just through the thickness of the growth; in about a fortnight the frozen part is shed off from the underlying unfrozen parts. About forty seconds are required for a nævus, rather longer for a wart, and fifteen seconds for a thin X-ray wart.

There is another method of applying CO₂ snow; it is to put the loose snow into a measure glass, pour a little acetone on it, which makes a viscous liquid with it, and paint this on to the skin with a brush for about *five seconds*. This is specially useful for large areas such as occur in nævus flammeus (*i.e.*, port-wine stains) and lupus erythematosus. Don't do the same spot twice at the same sitting, or a slough may form.

2. *Heat.*—(a) Electrocautery. I use the ordinary electrocautery from either 4 to 6 volts accumulators. More frequently I use the electrocautery from a step-down transformer direct from the mains; a voltage of 4 to 6 is best. The electrocautery is, as you know, very useful in treatment of many nasal complaints—in granular pharyngitis, for nævi, moles, warts, etc. Warts and small moles can be removed in one sitting by freezing by ethyl chloride and then burning off with electrocautery; wait until all the liquid ethyl chloride has evaporated before turning on the current, or it will catch fire. A practical point is to burn fairly deeply and to wipe off the wart, or tell the patient to do so at the end of twenty-four or thirty-six hours, not longer. A line of separation, due to the burn, occurs, I believe, in the prickle-cell layer of the skin, and if the wart is taken off while this separation blister lasts it is cured; otherwise it may harden down and commence to grow again. I have found this method the only good one for those troublesome and painful wart corns that form on the feet and are the despair of ordinary chiropodists. Several applications at intervals are sometimes necessary to cure these.

b. Heat from wires. Air blown over wires heated by electric current in the hot-air douches are very comforting in certain painful

affectio ns; also the now much advertised electrotherms or mats heated by concealed electric wires.

c. Heat from arc lamps. I use an ordinary angold alternating arc lamp, but, instead of using it enclosed in glass, I project the rays by a parabolic mirror on to whatever part of the patient is desired; this is better than using any condensing lens, for the lens intercepts a great number of the heat and violet light rays, and an arc lamp gives off more penetrating rays than does any form of incandescent filament lamp.

d. Incandescent electric lamps, used either by Dowsing or ordinary carbon or metal filament lamps put in suitable reflectors or baths. Recently I have used a much more efficient form, this large, very high candle-power lamp set in this big reflector. This method was introduced in America under the name of leucodescent lamps, but they are just high candle-power carbon filament lamps; this lamp takes $2\frac{1}{2}$ ampères at 200 volts.

e. Heat is obtainable in a similar way from a mantle, either ordinary or specially made, heated by gas in an inverted burner. This one I have here is the direct outcome of the visit of our division to South Metropolitan Gas Works, and I have to thank them for the great care they have taken in making this (and reflector for electric lamp, too) according to my requirements.

These various forms of heat baths are useful in sprains, myalgias, neuralgias, neuritis, as in sciatica, lumbago, in arthritis, and contractures due to rheumatism or other like forms of intoxications, and also, of course, used to produce, when desired, sweating in renal diseases. I find the arc light and the large incandescent are by far the most pain-relieving of these methods and the least enervating or tiring, and I often use the arc and incandescent lamps combined. The heat from this gas burner is especially applicable in patients' own houses.

3. *Light.*—The uses of light, as apart from heat, are many and of decided utility.

From carbon arc lamps, as in the well-known Finsen arc lamp. A great disadvantage of this form of light treatment is that the part to be treated must be rendered anaemic, usually by pressure, or, as done more recently on mucous membranes, by adrenalin, and the area, therefore, is very small—about one square centimetre only. On this

account this method has been almost entirely replaced by mercury vapor lamps, either the Finsen-Reyn lamp with a quartz tube and quartz compressor, or the more simple glass mercury vapor lamp.

The quartz lamp is most useful in treating lupus, rodent ulcer, either on the surface or more deeply placed, and also by use of quartz rods on mucous membranes of nose, rectum, vagina, etc.

The ordinary mercury vapor lamps are more useful in treatment of superficial large areas of lupus, lupus erythematosus, and in many skin diseases, as chronic eczema, and are especially useful in alopecia: it seems to induce a growth of hair when all else has failed.

We now come to the method of treatment by radiant energy, which is probably the most useful of all, viz., X-ray or Röntgen rays. During my seventeen years' work I have learned to have less and less respect for some of these methods and more and more for others. Treatment by X-rays certainly is becoming more and more useful, and the range of diseases benefited by it greater in number. This is partly due to improvements in apparatus, but still more is due to improvements in technic, which is each year getting more exact as experience teaches the workers with this powerful method of treatment.

We have had electrical appliances sufficiently powerful to produce suitable currents, but the X-ray tube, although much improved, has limited our efforts. Quite recently, however, a new departure in tubes has been made in Germany and America, and in the X-ray tube of Dr. Coolidge, of America, we are promised as great a revolution as was effected in cycling and motoring by the adoption of the pneumatic tire. In an ordinary X-ray tube we use the electrons of the residual air to carry the current and produce X-rays by their impact on the anticathode of the tube, and our tubes become useless by the vacuum getting too high or too low; *i.e.*, by there being too few or too many of these electrons.

In the Coolidge tube the air is pumped out so as to produce as perfect a vacuum as can possibly be obtained, and no electrons are left to carry any current. The cathode is made of tungsten wire, like that in metal filament lamps, in a flat spiral in a tube of molybdenum, and electrons are produced from this wire in as few or as large quantities as are wished by heating this tungsten spiral by a

battery current; the coil current then hurls them against the tungsten anticathode: this weighs four ounces.

In one test 25 milliampères were passed for 50 seconds (*i.e.*, 1250 milliampère-seconds) without harming the tube, whereas the best of ordinary tubes will not stand more than 10 milliampères for 5 seconds, or 50 milliampère-seconds; *i.e.*, the Coolidge tube can give at least 25 times more current, and should be able largely to replace radium in the treatment of malignant growths, etc. This, however, is for the future. What has already been done and can be done now?

X-rays have proved to be most useful in the treatment and cure of lupus, rodent ulcers, superficial epitheliomas, and superficial recurrent nodules of carcinoma. It is becoming the routine treatment, after surgical removal of epitheliomas, carcinomas, and sarcomas, to have X-rays applied to the whole area involved, to prevent recurrence, and this should be done at intervals ranging from one week to six weeks and from four to a dozen or more times. I have treated many such cases and have the greatest faith in its efficacy. One should filter the rays for this purpose.

In 1903 I wrote:

If I myself were unfortunate enough to get epithelioma, say of the lip, would I have it excised or would I X-ray it? Certainly I would X-ray it first, and, if that did not do, I should have it excised and then should X-ray the parts afterwards. The same with lupus and rodent ulcer—I should certainly X-ray them first.

If I got a carcinomatous or sarcomatous tumour I should *first* have it excised thoroughly, and if I survived I should X-ray the part afterwards and continue doing so from time to time, so convinced am I of its local beneficial action,

and to-day I strongly endorse this opinion.

Now what about the treatment of *inoperable* malignant tumors by X-rays; and, if you will allow me, I will here add, and by radium? Should we use them or advise their use or *not*? Well, the rule is, I believe, very simple. If we can give the deeper and less accessible spots a sufficient dose to cause degeneration of the malignant cells, then certainly use X-rays or radium; if we cannot, then as certainly do not use them. It has, I believe, been abundantly proved by many workers, and especially by Professor Abbe, of New York (see *British Medical Journal* of last year), and Professor Clunet, of Paris (see next April's issue of the *Journal of British Röntgen Society*), that both X-rays and radium have the following action, which may be easily illustrated by treatment of a malignant ulcer of the skin.

In the centre, where dosage is greatest, there is actual destruction of malignant and all other epithelial tissue; beyond this, there is retardation of growth, and beyond this, again, actual stimulation and often rapid increase of growth. If oat grains are exposed to X-rays or radium for, say, one hour, their subsequent growth is prevented; if for half an hour, the growth is retarded; if for five minutes, they grow much more strongly than ordinary oat grains.

Therefore expose the malignant growths to sufficient dosage of X-rays or radium to retard growth of its ultimate parts, or, if this is impossible, don't expose them at all.

If in one part of a body, for instance, malignant glands were so accessible, and in another part they were not, it would be quite justifiable to treat the former, but not the latter, unless, of course, the latter were certain to kill the patient before the former. One point one must also remember: X-rays often cure the pain of painful inoperable cancers in a wonderful way.

X-rays have been very extensively used during the last five years on the continent, and more recently in England, for the treatment of uterine fibroids and also for the menorrhagia of the menopause. There are two schools of treatment: (1) Those who follow Professor Albers Schonberg, of Hamburg, who has for five years used the moderate dose method; i.e., filtered doses for four days in succession, about eight minutes a day, with a fortnight's interval, and then another four days, another fortnight's interval, and so on. (2) The intensive method of Gauss, of Freiberg, who uses massive doses of several hours' duration, but uses them only once or a few times. They both use very hard X-rays, filtered through two or three millimetres of aluminum and some leather or bromide paper.

This treatment is extraordinarily successful; Albers Schonberg has had 78 per cent. cures of all cases treated during five years, and Gauss is so successful that I heard a gynaecological surgeon complain that there were now no operations for them to do in Freiberg except for appendicitis and such like.

I have not as yet done any fibroids, but there is no inherent difficulty in them. The treatment of climacteric menorrhagia not due to fibroids is easier and requires small doses only, and is very successful.

X-rays are also very successful in the treatment of splenic leukaemia, and patients tolerate much dosage; the chief drawback is

that if X-ray treatment is left off altogether the leukæmia gradually returns, but it can be kept at bay by exposures at long intervals.

X-rays have also been used in the treatment of exophthalmic goitre or Graves's disease, and I have had several fairly successful results. It is better to expose only half or two-thirds of the thyroid gland, as in cases in which the whole gland was irradiated the Graves's disease was cured and myxoedema supervened. It is certainly a safer treatment than operation, in my opinion, and more useful than any other form of treatment, except very prolonged rest.

X-rays are also very useful in the treatment of painful affections, as sciatica, lumbago, troublesome neuralgic affections of posterior nerve-roots, and other forms of neuritis. Hard and filtered X-rays should, of course, be used, and are best applied to point of emergence of the respective nerves.

X-rays are very useful in the treatment of many skin complaints, especially when of a chronic nature, such as pannus, trachoma, keloid, psoriasis, and chronic eczema. One can often cure cases of dry, indurated chronic eczema that have lasted for many years.

X-ray treatment is a certain cure for hyperidrosis, especially for the excessive sweating of axillæ. It is very useful in hypertrichosis or excess of hair on ladies' faces, but a permanent, more or less shiny spot replaces the hairy area.

X-rays are most useful in the treatment and prevention of boils and in severe acne. Its proper use in chronic acne of the face, neck, and back is very gratifying to patient and doctor. For instance, two years ago I treated a young man whose back had for five years been riddled with furuncular acne, despite all sorts of treatment: about twelve applications of X-rays quite cured him, and he has had no recurrence since, and I have had many successful cases.

Last but not least, X-rays are now *the* method of cure of ringworm of the scalp. As I can claim this method as a child of my own, I hope you will forgive me if I tell you about it. I believe I was the first person in Great Britain to suggest and successfully use X-rays for ringworm.

My first successful case was begun in November, 1902, and finished early in January, 1903; I show you a photograph of this case, taken some months afterwards, when the hair had grown again.

This case was followed by many others, the results of which I published in the *General Practitioner* in 1904.

I wrote a fuller paper in November, 1904, which, with photographs, was published in the *Archives of the Röntgen Rays* in August, 1905. In this is shown what I believe to be the very first case in which the whole head was treated. This was done in the second half of 1903.

In December, 1906, I devised and tried an overlapping open method; that is, one which obviated the necessity of protecting devices on the child's head. I show you some photographs of the first case so treated, which was most successful.

Soon after that Dr. Agnes Savill tried the overlapping open method, and then Drs. Adamson and Critchley in this country and Dr. Kienböck in Vienna much improved the overlapping open method and invented the 5-inch, 5-area naked overlapping method, now almost invariably used. Sabouraud's pastilles and distance were adhered to, the distance being measured by transparent wooden rods, which are usually called Kienböck's, but which I prefer to call Adamson's, because I believe that he and Dr. Critchley used them first.

This method is very safe and satisfactory, but, as it entails the head being at least six inches from the anticathode, it is rather slow and tedious if many cases have to be treated.

To get over these difficulties, Dr. Hampson devised a method for shortening the time required by putting the pastille on the child's head and bringing the head to within about $4\frac{1}{2}$ inches of the anti-cathode—that is, the "half-time distance." I have worked with his method, and find it efficient and quicker, but, in my opinion, it has two disadvantages: that it is very difficult for most workers, even in the proper artificial light, to match accurately all the requisite tints; and that without some other control it is hardly safe enough.

To overcome these disadvantages I devised a modification in technic, which I think combines the safety of the Adamson or Kienböck-Sabouraud method with the rapidity of Hampson's. I have had a wooden tube shield made with a full 5-inch aperture, and with transparent distance rods of such a length that by simply removing them with their holder and putting the child's head at the level of the aperture one moves it from the "full-time" Sabouraud distance to the "half-time" Hampson distance; for instance, with a 5-inch (or

13-Cm.) tube, the rods are $1\frac{3}{4}$ inches in length vertical measurement; with these distance rods of mine in place, the child's head is 6 inches from the "anticathode"; with the rods removed, the distance is $4\frac{1}{4}$ inches—that is, the "half-time distance." I have also devised a very simple, pencil-like pastille-holder, and this is inserted radially to the anticathode.

With my rods in place I put the pastille at Sabouraud's half distance—that is, 3 inches from the anticathode. When the rods are removed and the head moved to the nearer distance the pastille distance is kept the same (3 inches from the anticathode), but a new pastille is, of course, used.

I use a small piece of bandage across the opening of the tube shield. This is kept in place by being fastened to pieces of bonnet elastic with safety hooks to the rim of the shield.

I pass round a few photographs of a child's head treated 26 days previously by this method, and I do not think that any one can tell which areas were treated at the full-time distance and which were done at the half-time distance.

I contend that my method is at least as safe as Sabouraud's and more than a third of the time quicker.

With regard to general results: Before we had Sabouraud's pastilles in 1905 I had one case with complete baldness over an area the size of a florin and two cases of partial baldness, and also one case in which the hair on the front part of the head of a fair-haired boy did not return for over two years, when, however, it grew well. Since I have used the pastilles I have never had any cases of permanent baldness nor any other ill-effects to the patients, and I have had exceptional opportunities for seeing and following up the cases. I believe I have treated about 700 cases.

Quite recently, since the above was written, I have had a case of partial dermatitis after use of X-rays in a child who had just previously been treated by some one else with picric acid; after four months, portions of this head are still bald, but it is now being treated by a mercury vapor lamp and I have great hopes that hair will grow on nearly all, if not all, of the head.

The ordinary routine after X-ray treatment is for the deslufvium of the hair to begin on the fifteenth day, for the head to be bald by the twenty-first or twenty-fifth day and so cured of ringworm, and

the child to return to school and for the hair to begin to grow again the eleventh week from the X-raying. The hair usually grows more strongly and more curly than before.

5. *Radium*.—As I have no radium I can give you no personal experience, but nearly all I have said as to X-ray treatment of malignant growths and chronic skin complaints applies to radium and to what is now more often used, radium emanation, which latter also is very useful in chronic arthritis and gout.

I warn you, if you recommend this very useful and potent remedy to your patients, not to let them be *had* by quack and spurious appliances which contain little or no radium. One can always have any specimen tested for a fee. Mesothorium is nearly as useful as radium, but is about as expensive for like activities.

At last we come to methods of treatment by electric current itself in its many modalities.

a. *Static Electricity*.—This is much used in America, less so in England; perhaps it will be more used in the future, as a compact condenser machine has recently been introduced.

Static electricity is useful in many functional disorders, as in headache, neuralgia, sciatica, also for alleviation of the pain and distress in persons being cured by the morphine habit.

b. *Continuous current*, either from the batteries or from the main, suitably guarded, is, of course, useful in electrolysis of hairs. The negative pole is applied to the needle. I always use the eye end of a very fine tweenie needle. One milliampère for about one minute is usually sufficient to destroy the follicle. The electrolysis of subcutaneous and submucous nævi is also very successful. The chief use, however, of the constant or galvanic current is now for ionization, and this is not only a fashionable but a really useful procedure. One must remember that all acid ions, like iodine, chlorine, and salicylic acid, are carried in by the negative pole, and bases like potassium, soda, lithia, zinc, and magnesium by the positive pole. (Positive for potash is a useful mnemonic.)

I will start an ionization experiment now—iodine and starch. Ionization by salicylic acid from a 2 per cent. solution of salicylate of soda is very useful for most rheumatic and painful affections, such as sciatica, lumbago, cervical and brachial neuritis.

Professor Leduc, who is the greatest authority on ionization, has

pointed out that the current enters only by the edges of conductors, so that the old-fashioned flat metal conductors should not be used, but metal gauze instead; this is edges all over, and is easily obtained now, as metal gauzes are used for trimming ladies' dresses.

The following is the method for the treatment of sciatica:

Thick towels in 2 per cent. hot salicylate of soda on sciatic side and with salt or lithia chloride solution on towels on other side of the leg or on back. The whole limb can be so done if we have long gauze pads, and patients will bear 20 or 30 milliampères for half an hour or more if towels are thick enough and pressure is evenly distributed.

Iodine and chlorine are also useful in these neuritic complaints, and also in fibrositis and in contractures like Dupuytren's—chlorine especially.

For sciatica and such like, if I use ionization, I generally use salicylate of soda and iodide of soda together, and also at the same time expose the whole limb to a radiant heat lamp. Ionization with these two remedies is useful in chronic rheumatoid arthritis, as of knee-joint, to relax joint, remove pain, and kill causative germs, but applications should be for an hour at a time.

Ionization with cocaine for pain, with zinc for rodent ulcer, magnesium for warts, copper for ulceration and for Riggs's disease and for ulcerating cancers, silver solution in the bowel for ulcerative colitis, are all proven remedies. The current should always be measured and care taken that right poles are used.

Polyformates to neck are used by ionization for senile changes and for chronic rheumatic affections.

c. *Alternating or sinusoidal and polyphase alternating currents* are all useful as stimulants to metabolism, the latter being especially useful if applied to the abdomen for chronic constipation.

d. *Rectified sinusoidal*, which I suggested eleven years ago, acts in the same way.

All these forms,—*i.e.*, constant, alternating, rectified,—can be applied in baths, and are extensively so used at places like Buxton, Bath, etc.; they help excretion of waste products set free from tissues and thrown into the blood by waters taken at these and other spas.

Slowly interrupted currents,—*i.e.*, rhythmically interrupted currents,—are now very extensively and successfully used for the treatment of obesity.

Professor Bergonie's apparatus consists of a specially wound, low-voltage medical coil with a metronome or other similar rhythmical interrupter in the primary. The secondary current is carried through a great number of variable resistances to large metal pads forming parts of a special chair, and to others placed on all the various parts of a patient, hot wet towels being interposed between each electrode and the skin. About twenty electrodes in all are used, and when the current to each is carefully regulated the rhythmical interruptions cause contractions of all the principal muscles of the patient's body without any call upon his nervous energy and with little or no pain; a great increase of metabolism takes place and fat is quickly reduced, as much as three pounds in each sitting. It is not difficult to reduce a person of fifteen stone to twelve stone in three months, and that without in any way exhausting his strength.

This method is also used to reduce frequency of the heart's action; if the heart is working at 100 a minute, the interrupter is put at 90, and soon the heart reduces to that pace, and so gradually it can be reduced to the normal for that patient.

Bergonie's method and apparatus was one of the features at last year's Medical Congress in London, and I believe that much work and many fees are being earned by this method of treatment, which is a real boon to the really obese. Bergonie's, perhaps, should have been classed under my next subdivision: faradic as a coil is used.

e. True *faradic current* is, of course, very useful, but only in a very limited number of complaints, especially to keep up nutrition of muscles and to stimulate nerve action in middle and later periods of paresis and paralysis.

The faradic coil is often used by the public for many complaints in which it is of no value except, perhaps, through the imagination. It is often better to rhythmically vary strength of current up and down by pushing the regulator in and out by the hand.

Faradic current, as well as interrupted galvanic, is, of course, also used in testing irritability and degeneration of muscles, but both these are giving way to Dr. Lewis Jones's condenser discharge for these purposes.

Last of all we come to *oscillating or high-frequency currents*. These are much used in wireless telegraphy. There was quite a boom, eleven years ago, of high-frequency for therapeutic purposes, espe-

cially in the lay press. As I then warned my colleagues, this would lead to high-frequency being used for unsuitable cases and a consequent slump would ensue: this has happened to a great extent. Nevertheless, high-frequency is still very useful for certain complaints. Dr. Sloan, of Glasgow, has done much real scientific work with it and proved its continued usefulness.

The ordinary high-frequency with damped oscillations is used with some success in all this long list of complaints, and its use is safe and quite harmless. I have proved it especially useful in the diseases in special type in the list,—*i.e.*, lumbago, sciatica, and neuritis,—and I use it for these in combination with the radiant heat lamp and sometimes alternately with ionization. For hemorrhoids and fissures of the anus high-frequency current applied with a vacuum electrode is really a boon, giving almost instant relief of pain and irritation and usually causing temporary, sometimes permanent, cure. Six to twelve applications will nearly always cure those most troublesome cases where there are many little painful fissures around the anus, which are hardly amenable to any other method of treatment. I have had many successful and gratifying results in hemorrhoids and fissures.

High-frequency is also very useful to restore the blood-pressure to the normal, both in raising it after it has been lowered, as by influenza, and by lowering it in arteriosclerosis; in both cases the blood-pressure must be watched carefully by a suitable sphygmomanometer.

Another form of oscillating current is *diathermy*, or undamped oscillations. This current also is quite painless, if full and proper contact is made with the electrodes, but if allowed to spark, the spark burns in a peculiar way. This current heats all it passes through, and this heating effect is used in surgery for coagulating the tissues of, say, a malignant tumor, which can then be removed without loss of blood and, it is claimed, with prevention of the danger of spreading of malignant foci at time of operation.

Its heating effect to a lesser degree is used to heat up a stiff or painful joint by passing current through the joint. We can quickly raise the temperature of a joint all through to 105° F., and it will continue at that temperature for an hour or more after the current is turned off.

Dr. Nagelschmidt, of Berlin, uses this current also for aneurisms

and for some heart affections, but in England we are rather shy of using this possibly two-edged tool for such complaints.

In conclusion, I should say that the methods I myself most often use and find most useful are solid CO₂, heat from these incandescent lamps, X-rays in superficial skin and malignant diseases, after operations for breast and other cancers, for ringworm of the scalp and for sciatica, ionization for sciatica, lumbago, etc., high-frequency for piles and fissures.

ROUTINE OF PRACTICAL VACCINE THERAPY

BY DR. HORACE GREELEY,

Brooklyn, New York

THE natural processes by which all solid and insoluble materials, such as dead body-cells, occurring within the system, are rendered soluble and eliminated depend upon digestive activities akin to those which, within our alimentary canal, reduce our food to the assimilable state. While these latter are mainly dependent upon special enzymes, secreted by particular glands, modern research indicates that the leucocytes take a prominent part, since their number is so massively increased in the gastro-intestinal villi during active digestion, as well as in the general circulation shortly after a meal. However, parenterally—without the digestive tract, but within the body—the leucocytes are the dominating digestive elements, and, while all body-cells, in common with all cellular life, have digestive activities, these are exercised mainly for their metabolic processes of self-nutrition and normal function. Even if every cell of the various body tissues contributed to the general waste-rendering work, the inability of all, with two exceptions, to either move about (red blood-cells are more properly special cellular products than actual cells) or to actively multiply would greatly restrict their power to meet unusual requirements, as would be presented by a mass of dead adjoining cells or of invading parasites. These two exceptions are the leucocytes aforementioned and the connective-tissue cells whose proliferation responds so quickly to local irritation. These latter cells, however, are probably effective to only a very minor degree, and all belief in special activity on their part is based upon their ability to multiply under the stress of inflammation, and the phagocytic possibilities of some of their variations, as the multinuclear cells of tubercles.

Of course, since every body-cell contributes its excretory quota to the general plasma, and since it is certainly probable that each and every one forms a proteolytic enzyme, it cannot be denied that, as a whole, the body-cells may, especially under unusual stimulation, add

to the active enzymes of the plasma; yet all the phenomena of tissue resolution and inflammation show that in this particular the major rôle is always played by the lymphatic cells, and that wherever these be lacking liquefaction processes are always most protracted and infections prone to spread or to become chronic.

Therefore, when infectious agents have penetrated the tissues, the only power competent to remove them or the solid residue of their activities is this proteolytic function, which, for the reasons just given, as well as the well-known phenomena of phagocytosis and the enzymic activity *in vitro* of leucocyte extract, depends principally upon the leucocytes. Of course, soluble products of parasitic activity, such as the toxins—formed in appreciably active quantities by the diphtheria and the tetanus bacillus—are not included, since they would be easily eliminated by the usual avenues were it not for the great affinity which particular body-cells have for them—an affinity which, of course, is reflected in the antitoxins that, it is surmised, are but an extension of the special cell sensitiveness to the blood—whether through the addition thereto of derivatives from the susceptible cells, or otherwise, has not been determined. Toxin-antitoxin combination seems to fall in with the general body-waste in process of excretion.

It may be stated as a general rule that any non-specifically immunized animal is susceptible to any microorganism that can gain access to its tissues and survive under the physical and nutritional conditions existing. Now the very fact that an invading organism can make use of the normal body materials necessitates the possession by it of enzymes akin to those of at least some of the body's cells which feed on the same pabulum, and since these enzymes affect the wear and tear of the parasite's economy, as well as its buildup, the related body-cell enzymes must possess at least some such action upon the parasite. Every living body-cell evidently has the ability to ferment, digest, its protein food, and while in the case of the fixed cells, feeding on the plasma only, this food being especially prepared and of stable composition, the enzymes required are probably of the simplest, those elaborated by the leucocytes—the wandering scavenger cells—must be of such a character and power as to affect each and every other protein structure of the body in order that they may efficaciously remove waste from every organ; further, every body-

cell contributes its quota to the plasma, and, therefore, any enzymic action possessed by it (the plasma) must be a complex of the whole.

With the foregoing considerations in mind, we can understand that, when a parasite first begins development within the host, the latter's plasma enzymes react, at least slightly, with its peculiar proteins, either as presented by the surface of the individual organisms, or by material discharge therefrom. So soon as this takes place, the well-known effect of increased use of a body product in stimulating increased production comes into play, and soon the plasma enzymes, through such stimulation, become sufficiently powerful to effect appreciable proteolysis of at least the surface material of some of the parasites, resulting in a layer of protein decomposition products, albumose or peptone, perhaps, of the same chemical nature as body waste products which the leucocytes are accustomed to engulf, phagocytose, and reduce in their ordinary routine. After this coating or partial digestion (sensitization), and only then, the parasites are actively attacked by the leucocytes. Of course, the living parasites or the partial decomposition products of parasites may, when a given leucocyte is exposed thereto under unfavorable conditions, such as too great concentration either of germs or products, destroy that cell.

When the products of the action of the moderately strong plasma enzymes upon the parasites, or those of any incomplete phagocyte digestion, when the cell has perished before completing it—albumose, peptone, or like substances—pass into solution in the plasma in amounts which are physiologically active, we get the first symptoms of infectious disease. These symptoms are due to the poisonous action of the said incompletely digested parasites, and are the same as would be produced by the peptone of ordinary gastric digestion.

Digestion of parasites by phagocytosis, since the leucocytes, as explained, are complete protein digestion machines, being producers of the most powerful and most generally applicable proteolytic enzyme, may be regarded as being usually so complete—unless the phagocyte dies during the process—as to reduce the decomposition products, before they escape from the phagocyte, beyond the point at which they could act as irritants, just as continued proteolysis, in enteric digestion, carries peptone, a cellular poison, into amino-acids, which are entirely innocuous under all conditions. However, as the disease progresses, even the plasma enzymes may become powerful

enough to effect a complete disintegration (to amino-acid stage) of the infecting agents presenting, when one would expect symptoms to often subside by crisis, which they do, since the partially digested products, which alone irritate the tissues, could no longer accumulate in nor be disseminated by the plasma.

A word or two should be said about leucocytosis. In the first place, it is plain that the withdrawal of the products of an organ or a tissue, as in the simple example of the milk or any gland secretion, directly stimulates the formation of new products. This acts through a reduction in the pressure exerted on the producing cells, and their consequent swelling, which sucks in a new plasma supply from the increased blood influx influenced by the same diminution of pressure, the whole resulting in greater nutrition, growth, function, and reproduction—if cells possess this power. Now, since the main sources of the leucocytes are the lymphatic tissues, bone-marrow, lymph glands, etc., if anything causes a withdrawal of leucocytes therefrom, the formation of new leucocytes will be stimulated, and, as when stimulated these cells exhibit marked amoeboid movements, such stimulation would alone increase the rate of exit from a gland, for example, of its leucocyte inmates. Therefore, if we have an infection whose agents, or their products, circulating in the lymph, reach and stimulate the leucocytes of the bone-marrow, lymph glands, and other such tissues generally, we are certain to have both an increased presence of these cells in the peripheral circulation, and an increased production thereof in the lymphatic tissues, for the reasons given. We now have to decide what constitutes a stimulus to a leucocyte, and since, in connection with the relation of these cells to parasites, we need not consider physical changes in surroundings, we are limited to the irritant or chemical action which may be exerted. A leucocyte, besides being an embryonal cell type, exhibits metabolic activities representative of those of all other body-cells, and, as a consequence, it is, to at least some degree, susceptible to each and every influence that an infecting agent can exert upon any other body-cell. Therefore, just so soon as parasitic products reach a leucocyte its activity is directly stimulated. Of course, the extent of the stimulation varies according to the nature and amount of the stimulating agent and, perhaps, even according to the vigor of the individual's lymph tissue, so we accordingly find infections such as

those due to the cocci, accompanied with a marked leucocytosis, and others, as typhoid, with none.

The absence of leucocyte proliferation in the latter type of infection is probably not owing to a specially toxic action of the infection upon the lymph tissue, although the infectious agent is active in it, since, were this so, the frequent development of leucocytosis, owing to a late coccus complication of typhoid, would hardly take place so regularly were the leucocytes specifically attacked, and, furthermore, were this last true, many cases, during convalescence at least, would show marked leucocytosis. In such infections the case must be that neither parasite nor leucocyte is much affected by the other. Recovery is even possibly due to enzymes proliferated by other and more tardily acting body-cells than the leucocytes.

Such being the processes concerned in the natural development of immunity, we may now properly consider when, in a given infection, we may advantageously interfere in an attempt to stimulate the production of the protective agents.

In the first place, whenever it appears that the system is working under what may be called forced draught to the end in question, it is at least unnecessary to meddle; in fact, this is even dangerous, since the increase in the amount of the specific bacterial protein to which the tissues are exposed, at a time when the enzymes on hand are unable fully to cope with its active representatives—the living bacteria—must, temporarily at least, reduce the opposition to the latter, since some of the enzymes will certainly be absorbed by the vaccine. So far as present information guides, marked and continuous constitutional symptoms, of which the chief is fever, are evidence of the presence of these conditions, and, since such uniformly maintain in acute infections, one must exclude the latter from cases suitable for vaccine therapy. From animal experimentation we know that in artificially induced septicæmias a localized inflammatory process, due to the inoculated organism, appears to assist greatly in arresting the general process, but, since this local reaction may occur only in animals with a preexisting high specific resistance, it may be a consequence and not a cause thereof. In lobar pneumonia, an acute disease such as has been stated to be most probably unsuited to artificial active immunizing processes, many attempts have been made to employ vaccines with benefit, but the results have

all certainly been "inconclusive." One thing, however, is certain and, although out of place, since lengthy consideration of the phenomenon must be seen in another part of the present article, should be noted here, and that is that some reaction at the point of injection of a vaccine is essential in all cases that even a hope of favorable influence may be entertained. From another standpoint, the use of vaccines in acute conditions, lasting a few days, as the form of pneumonia mentioned, is deprecated, and this is that since, as will be explained further on, no dose of vaccine can be usefully repeated in less than a week, and since general experience indicates that at least several doses have to be given before noticeable benefit can be obtained in even those conditions most amenable to this form of treatment, the crises of such maladies are reached before we could hope to have effected perceptible increase in the specific resistance.

As infections pass into the chronic, or even into what have been called the subacute, condition, such as a lingering bronchitis or bronchopneumonia, the propriety of the use of vaccines increases, since here constitutional symptoms are in abeyance, and there is, therefore, indication that the general reactive and immunity-producing processes are not being stimulated to their full capacity, and as there is also a sufficient amount of time in which to employ such agents with definite technic, along lines of which we have some knowledge and where we, consequently, possess some ability to regulate dose and interval in accordance with our case. Furthermore, with all chronic infections the existing resistance is already considerable, and even with our essentially crude methods of dosage there can be but slight chance of doing serious harm from a single overdose, while in all acute infections the system's resistance is certainly at a low ebb and a misplaced dose might easily bring disaster. Such is the case in typhoid fever, although certain empiricists, rushing in where angels might well fear to tread, have used vaccines in treatment.

As to the use of a vaccine (tuberculin) in tuberculosis, while it is undoubtedly as efficacious in the forms that are usually denominated surgical as vaccines are in other chronic infections, the same cannot be said when the disease involves the lungs. This may be either from the influence of the secondary infection, which is always present, or from the effects produced by the focal reaction, which, in the case of lung disease, might be expected to vary from the usual,

even if only on account of the phenomenon which, through animal experimentation, is known to follow each injection of a bacterial protein, the congestion of the lungs with great numbers of leucocytes, each carrying, intracellularly, a load of the introduced material; and, as it is well known that the tubercle bacillus is a particularly tough morsel for leucocytic digestion, it is very probable that the immediate net result in and around the diseased focus is an increase of those lytic substances derived from this bacillus that are so destructive to the pulmonary tissues, and which favor extension of the disease.

With all infections it behooves the physician to make as exact a bacteriological diagnosis as the advancement of our knowledge permits, but, if the condition be such as we have already decided is suitable for vaccine treatment, this diagnosis may well be undertaken in conjunction with the preparation of a vaccine, since part of the work in each case would be duplicated in separate attempts.

In securing a specimen of the organism responsible for the diseased process there is rarely any difficulty, provided the lesion be easily accessible from the exterior, but in certain instances, as with chronic rheumatism, such is not the case, and we are compelled to seek it in either the blood stream or in the urine, in both of which stray passengers from bacterial settlements in the various parts of the body are more common than is generally supposed. Of course, when a microorganism is secured from other than the lesion under consideration, one must seek confirmation of its supposed culpability in the focal reaction which should follow the use of a vaccine prepared from it, as will be explained. A complement-fixation test would only prove that the germ was active in the body somewhere, which we would know, since it was caught therein, but would not connect it specifically with the diseased focus under examination.

In taking a blood culture, in such a condition, it is desirable to draw as much as ten or even twenty cubic centimetres of blood, since the more blood the greater the chance of getting an organism scantily represented therein; so, after washing off the skin of the bend of the elbow with soap and warm water, followed by alcohol, one should constrict the arm with either a rubber bandage or tube, and thrust a needle, the size of the ordinary antitoxin needle, into one of the large veins that are so readily made prominent here. Of

course, the needle is sterile and is held by the middle. The blood should be caught directly into tubes of fluid nutrient agar of a temperature of about 50° C. to an amount equalling that of the medium already therein, and so soon as the requisite amount has been drawn all the tubes must be rolled rapidly between the hands to mix the contents. Half of the total number of tubes are then emptied into Petri dishes, and, after the medium has solidified, both dishes and remaining tubes are incubated for twenty-four hours. Aërobic organisms will appear in the dishes, and anaërobic ones in the depths of the tubes.

In collecting urine for a similar purpose, a sterile catheter may be passed, and some of the last urine that flows from the bladder may be gathered and cultured, in the same way as detailed for the blood, although, of course, we may thus gather bacteria from the bladder, as well as those coming through the kidneys.

Apart from ulcer of the stomach, which recent research indicates is probably a streptococcus lesion, I cannot think of any gastro-intestinal condition in which vaccine therapy could reasonably be applied, but, if such a condition should appear, it would naturally be difficult to isolate the guilty germ from such a complex microbial mass as the faeces, unless it be one of the colon group, or a particular organism of known characteristics, for which we searched.

There is sometimes a chance that we may pick an organism that is merely acting the part of a saprophyte on the secretions of the body, or on the products of the activity of the real culprit, as, I think, has been done by those who blame the so-called acne bacillus for the manifestations of that disease; although, of course, it is entirely possible that more than one variety of parasite may be concerned in a given process, as is undoubtedly the case in most cases of pulmonary tuberculosis. In this last-mentioned disease the streptococcus, perhaps masquerading under his *nom de plume* of pneumococcus, is very evident and seems to be responsible for many of the symptoms evinced. I have seen cases, moderately advanced, relieved of slight cough and expectoration after a course of vaccine made from the streptococcus, which was at first found in the sputum in immense numbers, but which steadily diminished till only an occasional coccus appeared.

In preparing a vaccine it is always desirable to check the organism appearing in the culture against that obtained directly from

the tissues, and this is always easy when the source is such that a smear may be made of material containing the microbe in sufficient numbers as to be readily demonstrable by the ordinary staining methods, but when the culture is obtained from the blood this should not be attempted.

The medium to be used for the purpose of isolation of the infectious agent depends somewhat upon the organism that one expects to get, as a result of smear examination or simply from consideration of probabilities, but ordinary glycerin-agar is most generally useful, and, whenever necessary, can be modified by the addition of a small percentage (5 to 10) of sterile hydrocele fluid—kept conveniently in sealed test-tubes. This modification is necessary in the case of some organisms such as the gonococcus, and occasionally even streptococci fail to develop upon the glycerin-agar. Of course, with blood cultures the necessary serum is supplied incidentally. Solidified beef-blood-serum tubes may sometimes be usefully employed, especially for diphtheroids or streptococci.

The material upon which the original culture develops should be employed to grow the greater quantity required to make the vaccine, and it may be either distributed in a number of small test-tubes or in a three- or four-ounce bottle, in which, when solidified upon one side, ample surface presents to grow all the vaccine that could possibly be used for one case. Often, in selecting a colony from the original plant, we find that we have used so much of the available supply in making smears for examination that insufficient remains to well plant our vaccine flask, and we may be compelled to sow a single tube and wait a few hours for an increase of our seed.

As a rule, the vaccine should not grow for longer than twenty-four hours, as the surface of the medium gets dry and the micro-organisms are then difficult to detach, and are more apt to carry with them particles of the medium. Vaccine should be washed from the surface of the medium with normal salt solution into a test-tube whose upper part has previously been drawn out into a neck, and this neck should then be sealed in the flame of a Bunsen burner which has been laid on its side to avoid having to tilt the test-tube. Sterilization of the vaccine is best done in a water-bath of 60° C. for one hour, as this temperature assures the death of all organisms much better than that often recommended of 56° C., and never acts to

change the material in a way as to diminish its immunity-stimulating properties, as higher temperatures may undoubtedly do. To verify the death of all microbes in the vaccine, one may take a large drop of the material and smear it over the surface of a tube of the same medium as it was grown upon, but so soon as the tube holding the vaccine is broken open the contents should be measured and have added from one-quarter to one-half per cent. of phenol, which is preferable to trikresol, as it is slightly less irritating to the tissues when injected.

There is only one fairly accurate way of standardizing a vaccine, which is to count its constituent microorganisms by means of a blood-cell counting apparatus, but under all circumstances it is first necessary to separate the microbes from each other, a proceeding often fraught with the greatest difficulty. Sometimes a few blows of the sealed test-tube, containing the vaccine, against the hand will suffice, but oftener much more is required, and such difficulty is so frequently encountered that I have had several apparatuses made in attempts to solve the problem. As is so often the case, the most elaborate proved impracticable, as too great a quantity of the vaccine adhered to the machine, which, besides, gave a great deal of trouble to clean and adjust, but I finally hit upon a very simple device which, worked by the current from a few dry cells, rapidly vibrates the test-tube of vaccine till, in a few minutes, a thorough separation of all the usual organisms is effected. The ordinary vaccine should be standardized so that the smallest quantity easily measured in a hypodermatic syringe should contain the usual first dose, 100,000,000, and, as a consequence, the value should be made 1,000,000,000 to a cubic centimetre; or, if the other system of measurement be desired, 1,000,000,000 to twenty minims of vaccine. Of such a strength, a total quantity of from ten to twenty cubic centimetres should be made.

As the charge for such a vaccine is usually \$5, it is easily seen that stock vaccines are more expensive than the autogenous, since a number of containers of the former always have to be purchased in order to carry out even a moderate course of treatment, which is many times provided for in the quantity of the autogenous preparation as usually supplied.

After an understanding and a consideration of the *modus oper-*

and of active immunization, few will ever use a stock vaccine, since the necessity of operating with the identical strain of the particular microorganism infecting a patient will be apparent, and the difficulties of making an exact bacteriological diagnosis and finding a stock vaccine to fit are usually insuperable. If, for instance, one has discovered that a patient has a streptococcus infection and should think of purchasing a stock vaccine made of this variety of organism, he will reflect that it is known to exist in fully half a dozen strains, of which experiments have proved that immunity to one is totally ineffective against another, so that even should the stock vaccine contain one or two of the six (and the probabilities are that, since differences in conditions of growth soon markedly affect most microorganisms, the number of important strains may vary somewhat accordingly, and therefore greatly exceed the number mentioned), that giving rise to the lesion might be one of the others. So-called "polyvalence" is really nothing more than a difference in source, since this is all that is even claimed by the manufacturers, and only by chance could provide actual multiplicity of strain. In cerebro-spinal meningitis the difference in strain of meningococci is well known and universally recognized, in that several varieties of anti-meningococcus serum have been produced, each one of which is only effective against that strain which was used as a vaccine in stimulating the production of the antibodies contained in the blood-serum of the animal employed in its manufacture. Of course, if no bacteriological diagnosis were attempted, and one should guess at the infecting agent, the chances of hitting the nail on the head would be even more remote, and reminds one of the children's game in which each player in turn attempts, while blindfolded, to pin the detached tail on a cut of a donkey tacked upon the wall, and which is more frequently hung to a player than in its proper place. Additionally, even though one of the units of a "polyvalent" stock vaccine were identical with the infecting agent of the patient's lesion, the rest of the vaccine, the large mass of the total, would be given needlessly, in fact harmfully, since the tax imposed by it on the parenteral digestive powers of the body reduces the general ability to manufacture enzymes, and, therefore, interferes with the elimination of the infection.

Autogenous vaccines avoid all such difficulties, and, once we are sure that we have selected the proper organism (usually only one

presents with anything like probable causative association), we can proceed in absolute confidence with our immunization.

Before giving the first injection it is desirable to have record made of the patient's daily temperature range, and this, taken at least twice daily for a period of from three days to a week, should be recorded on the chart that is to be used for the case. This chart should have space to show date of injection, amount of dose, local reaction, constitutional reaction, and fecal reaction; also, that check may be kept on the general condition, columns for weight, eating, digestion, stools, sleeping, and general improvement observed.

In injecting a vaccine, an all-glass syringe with an accurately-fitting, ground-glass piston should alone be used. It may be graduated in either system, so long as either minims or tenths of cubic centimetres can be measured, and it should hold at least twenty-five minims, or two cubic centimetres. A platinum needle is a great convenience, since it does not require the continual replacement of the obturator wire to prevent the filling of its calibre with rust, as does a steel needle; furthermore, instead of having to boil it after or before each injection, the remaining vaccine may be rinsed out with alcohol (95 per cent.) after use, and, just before an injection, the needle passed through the flame of an alcohol lamp. While the syringe, with its plunger removed and placed alongside, to avoid cracking, may be boiled before each injection, this is unnecessary, since the vaccine is sterile, and as washing out with alcohol, at the same time as the needle, after and before each injection, removes all refuse vaccine. The needle is, of course, always sterilized, in the flame if platinum, otherwise by boiling, conveniently in a test-tube.

The necessary cleansing of the skin, at the point of proposed injection, is always effected by a vigorous rub with a plegget of cotton and a little alcohol. Dilute tincture of green soap is also efficient, instead of the alcohol.

In general, the size of the first dose is best made 100,000,000, and it may be given in the usual region of the arm. Subsequent injections should, however, avoid the spot of a former puncture, since it is easily conceivable that, for at least some time after the introduction of a vaccine, the tissues at the seat of the local reaction may possess a greater antibody-forming ability than those elsewhere, and we should accordingly seek to establish as many such special

factory aids as possible. If one makes use of both upper and lower extremities there will be no necessity to return, even to the same lymphatic chain, oftener than once every four weeks.

If the first dose be followed by any one or all of the three varieties of reactions—local (at puncture), constitutional (as evinced by elevation of temperature, to watch for which the thermometer must be used twice daily), or focal (manifested by a temporary increase of symptoms from diseased area)—the following dose must not be increased, and may even be diminished if the reactions produced are thought to be too severe or too prolonged; but it must never be forgotten that it is from a marked reaction alone that we can expect benefit of moment. A moderate local reaction consists in slight swelling and increased warmth around the puncture, which is also frequently encircled by an areola of from half an inch to several inches in diameter. The size of the areola depends a good deal upon the distance beneath the surface that the vaccine was deposited. A moderate constitutional reaction is shown by a fever of from a half to two degrees Fahrenheit, lasting about twenty-four hours. The focal reaction always depends much upon the nature of the lesion, but when moderate consists in a noticeable increase of special local symptoms, arising from the diseased focus, lasting about twenty-four hours. Such reactions are usually always followed by satisfactory improvement.

Both reason and experience with animals experimentally and disease clinically indicate that a repetition of a vaccine injection, within a shorter period than a week, is apt to be harmful and in a cumulative way to overdose, so that unless special indications to even make the interval longer, such as a prolonged reaction (lasting over three days, with temperature elevation and increased symptoms), arise, this should be the period selected in the average case. If the individual be in active life it is well to give the injection on Saturday, so that the day following may be one of rest.

So long as a dose of a given size will cause a reaction of any sort it should be repeated at the next period without increase, and when no noticeable response follows its administration the next injection should represent an increase of not over ten per cent. If, in beginning a course of vaccine therapy, the first dose is not followed by any reaction, it may be increased at the next period to not exceeding

twenty-five per cent., and, so long as a failure to react continues, the same rate of increase may be kept up till at least ten times the initial dose has been reached, when, if still no response be obtained, one should suspect that something is wrong with the vaccine employed.

In a certain class of cases, if we give too large a dose, a prolonged lowering of the temperature will result without any reaction whatever, which phenomenon seems to indicate an unusual torpor of the body's protective, enzyme-producing processes. This condition is best met by a great reduction in the size of the dose, perhaps to one one-hundredth of the amount, and a weekly increase of ten per cent. till a reacting point be reached.

There is no definite limit to the number of doses that may be given in a course of vaccine treatment, nor to the time over which such should be employed. However, as the greatest benefit is apparent only some weeks after the last dose of vaccine, it is well to pause in a course, if at least ten injections have been given, when it is seen that we are near the maximum improvement that the condition admits, so as to allow this sequential effect to develop, that we may judge whether we have reached this maximum of reasonable expectation.

THERAPEUTIC VALUE OF DIRECT TRANSFUSION OF BLOOD IN DISEASES OF THE NEW-BORN

BY VICTOR D. LESPINASSE, M.D.

Instructor Genito-Urinary Surgery, Northwestern University Medical School,
Chicago

THE disease in which results have been best has been in the so-called hemorrhagic diseases of the new-born, which, as you all know, are due to an infection which disturbs the liver function so that there is a diminution or even complete absence of prothrombin in the blood. Most of these cases are due to diminution of the prothrombin. A few are due to an excess of the antithrombin. The direct therapeutic indication is to replace the coagulating elements as well as the lost red blood-corpuscles. Of course, you all know that this has been done in a variety of ways, by the use of various sera and products of sera. That side of it we will not go into, but consider only the treatment of hemorrhagic disease by direct transfusion of blood. Technically, at the present time, direct transfusion of blood is comparatively easy. It can be done on any size babe that you would be likely to meet. The smallest one I have had was something over four pounds. Experimentally, in using a dead babe and a live dog, I have transfused a pound-and-a-half babe.

In these cases of hemorrhagic disease the transfusion of live, non-clotted blood will stop the hemorrhage in from one to three minutes. It may seem odd that a child losing blood will stop bleeding when more blood is transfused into its blood-vessels, but such is the fact, nevertheless. Just fill the child's circulating system with blood from the father, or anybody present, and the bleeding stops at once. So soon as the child receives this blood, the blood-vessels are filled with fresh blood and fresh complement, fresh antibody, and the entire content of the normal blood, so that when you are through with the transfusion the child's general condition is much better than if he had not had the hemorrhagic disease. These children are then vigorous. They can nurse at once, and they make rapid gains and hold the gains made.

How much blood is usually put into these babies? We do not

gauge the amount by any set volume or weight, but by the appearance of the babe. Just allow the blood to flow in until the babe is a nice red. If the flow is too fast, the babe becomes blue, first around the feet and hands, and then around the face and neck, but if you stop and give the circulation a chance to catch up, oxygenation takes place, and the child will soon become red. In the ideal cases, when you first see the child it is about the color of white paper; after the transfusion it has the color of a new-born baby or the red of an ordinary scarlet fever case; then the transfusion may be stopped. In weight they will have increased anywhere from three and one-half to fifteen ounces. It may seem strange to you that you can put fifteen ounces of blood into an eight-pound baby, but I did it in one case. In this case the conditions were ideal, I had an excellent anastomosis, the veins were small, and the blood flowed for fifteen minutes.

To verify these weights, I took a seven-and-a-half-pound dog and put the blood of a fifteen-pound dog into him without removing any of the small dog's own blood. The only effect noted was an increase in vigor.

As to the advisability of using this large amount, there may be some question, but you can fill these patients up carefully until they are a good pink, anyway.

My experience with hemorrhagic disease of the new-born includes eighteen cases, and among those were two syphilitic children, both of whom subsequently died. The others all recovered. There was only one with any other complication, and that was a case of Drs. Dwan and Krost, who made a diagnosis of spasmodyc pyloric stenosis. The child was three or four days old, and had not retained anything from birth. The peristaltic waves could be seen. The plan was this: The baby was to be transfused to stop the bleeding and also to fortify it for the gastro-enterostomy that was contemplated. What happened was this: The child was transfused, using the father as a donor, and the spasm disappeared. Whether there was any relation between the transfusion and the disappearance of the spasm, I do not know. At least, the spasm was relieved immediately, and, in my opinion, direct transfusion of blood is worthy of a trial. We know that some spasms are due to intestinal intoxication, and so soon as the bowel is cleared out the spasms disappear.

One of the older treatments of conditions of intoxication was

bleeding to remove this intoxication. If these patients are bled, and then the lost blood replaced by normal blood, results should be better, as more blood can be removed than if you did not attempt to replace it, and in babies especially you can even remove all the blood. It is possible in babies to remove absolutely every particle of blood from the baby's circulation and replace it by normal blood from its father. This is not possible in adults, because we would not have enough blood to replace the blood taken. A normal baby, weighing ten pounds, has approximately an ounce of blood to a pound of weight—to-wit, ten to twelve ounces. The ordinary adult may lose that amount and never miss it. This idea occurred to me at the bedside of a week-old baby who had a very intense jaundice, with high temperature, but the people asked me what I could promise, and I said nothing, so they refused to have it done. I contemplated bleeding that baby to the maximum, filling it up, then bleeding it again, and my idea was to do that three times, so as to get rid of as nearly all the toxic blood as possible, leaving the babe's circulation filled with the normal blood of its father.

In acute nephritis cases, in severe intoxications of pneumonia, typhoid, scarlet fever, and diarrhoea, or any of the many infections, I think that it is worth while considering this treatment, at least, and in appropriate cases the use of massive bleeding, followed by direct transfusion of blood and removing the infectious body, as described, will prove beneficial. This probably is not as simple as it might seem, from a mechanical standpoint. The toxins and drugs do not always remain in the blood stream. They become bound by certain tissues, in a good deal the same way that tetanus antitoxin becomes bound by the nerves and spinal-cord tissues, so that after a certain time they are not removable.

Another condition where direct transfusion of blood is going to save some lives—a few, of course, but they are well worth saving—is in congenital stenosis of the bile-ducts. Post-mortem, there are probably somewhere between twenty to thirty per cent. of these cases in which the defect in the bile-ducts is remediable by operation.

In Boston, some years ago, they tried to operate in these cases, but they died of hemorrhage. That was before the transfusion technic was worked out as well as it is to-day. At the present time the hemorrhage can be controlled absolutely. The transfusion in these cases,

without operation on the bile-ducts, is of only temporary avail. The probable life of the blood transfused is approximately a week. So in any condition like obstruction to the bile-ducts, or of an infection of severe type, like the purpuras, if the patient does not get well in a week he will have a recurrence of the bleeding. Whether that is the individual life of the red blood-corpuscle in health, we do not know, but that has been the experience of several men, particularly Duke, in Boston, who worked up the subject of transfusion in purpuras, and he found that if the temperature did not go down in a week the bleeding recurred, usually preceded by a diminution of the blood-platelets.

In summing up, I would like to call your attention to the fact that direct transfusion of blood is not a destructive, but a constructive, operation. It is never too late to transfuse; the patient is never too sick. The baby can always stand the transfusion. Transfusion is not a knock; it is a boost. One of the bleeding babies we had here was in such a condition that we could not hear the heart for some minutes before the blood was transfused; that baby is alive and well to-day, about three years after the operation.

First.—Transfusion will save the most desperate cases.

Second.—It is worth while to use direct transfusion of blood in cases of obscure spasms, like spasmodic pyloric stenosis.

Third.—In severe infectious cases, scarlet fever, pneumonia, typhoid, a preliminary massive bleeding followed by direct transfusion of blood is of great value.

MASSAGE IN THE TREATMENT OF DISEASES OF THE BILE PASSAGES, PANCREAS, AND VERMIFORM APPENDIX

BY GEORGE EDWARD BARNES, B.A., M.D.

Herkimer, New York

As you read the title of this paper, have you an idea that its contents must be a phantom? I assure you that it is a very real thing, and hope that you will join the circle for its consideration, bringing with you your intelligent and active, but kind, scientific judgment. The study of diseases of the upper abdomen is, comparatively, still a recent thing, and even the small coterie of eminent men who have thus far contributed knowledge thereon would quickly admit that more still remains, and perhaps always will remain, to be known. In introducing massage in the treatment of diseases of the bile passages, pancreas, and vermiform appendix I wish to request that the subject be regarded not from the standpoint of the surgeon nor from the standpoint of the physician, but rather from the broad standpoint of a single medical science. Both physicians and surgeons will doubtless find this method of treatment a boon to their patients and to themselves. I hope that every member of the profession who has these cases to treat will assist in establishing definite indications and limitations for this method more fully than I can do at this time.

You are probably wondering how the hand can be applied to the bile passages for their treatment. Biliary massage is effected not by the hand alone, but by a physical manœuvre on the part of the patient. The proceeding must be taught to the patient so that he can perform it alone or with assistance. The patient lies down on the back. The thighs are raised with legs flexed on them. The legs may be crossed at the ankles to give them stiffer support. By drawing up the thighs intra-abdominal pressure is increased by the contraction of the muscles of the anterior abdominal wall, by the tilting upward of the pelvis, and slightly by the pressure of the thighs against the abdominal wall. The right hand is placed with the palmar surface of its base over the region of the gall-bladder which lies just below the costal cartilage of the ninth right rib. The left hand is placed on the right hand to reinforce its action. The lungs are filled by a deep inspiration. The

head is raised by muscular action from the pillow, and all the muscles of the anterior thorax are rendered tense by bending the thorax forward. Pressure is made by the hands firmly downward toward the gall-bladder both to prevent the right thoracic wall from bulging and also to act on the bladder. The diaphragm is then brought into action in a series of several rather quick and only slightly relaxing contractions. By this whole process the intra-abdominal tension is raised so as to make a firm background on which the gall-bladder may rest while the short, quick massaging movements of the diaphragm compress it so that the contained bile is forced along the line of least resistance, which is toward the unyielding posterior abdominal wall,—that is, through its ducts and into the duodenum.

The final coup of this method, the voluntary contraction of the diaphragm, is the hardest part for some patients to perform. They can usually be taught. A good way to do this is to place your hand on the patient's abdomen and tell him to push it up with his abdomen by contracting the diaphragm. When he can do that, tell him to bear down with both his diaphragm and his abdominal muscles, and when he can do this he will probably be able to bear down in the same way in performing the massage. Of course, the massage is most effective when this voluntary action of the diaphragm can be used, but it can be made somewhat effective without the diaphragm. When the diaphragm cannot be brought into action the other movements of the massage must each be exaggerated, the short, quick contractions of the abdominal and thoracic muscles producing the massage. The method may be somewhat modified, also, to meet the exigencies of cases. When the patient cannot use all his muscles in the dorsal position, perhaps he can in the sitting posture, having a stool for his feet and bending the body well forward. In the sitting posture the direction of the bile passages and the position of the duodenum are not so good.

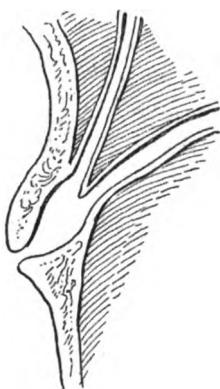
As the massage just described raises intracranial blood-pressure, it should not be used in cases of arteriosclerosis which are at all advanced.

However this massage may be applied to the bile passages, it is often best that it should be accompanied by moderate pressure across the abdomen above the umbilicus from left to right. The reason for this transabdominal pressure will appear further on. On account of the limited size of the hand it is not easy for the patient to make this

pressure himself, but he may do so, if necessary, by extending the fingers of his right hand over the lower epigastrium and using the left hand in part to reinforce them. It is best made by a second person. Furthermore, it is sometimes desirable that after this massage the patient should lie on his back, or partly on the right side, and place the left arm so that the elbow will be near the ilium and the forearm will lie across the abdomen above the umbilicus, thus making gentle pressure.

In practising massage on the biliary passages or on the pancreas it is necessary to keep in mind the facts about the intimate anatomical relation existing between these two systems. The common bile-duct

FIG. 1.

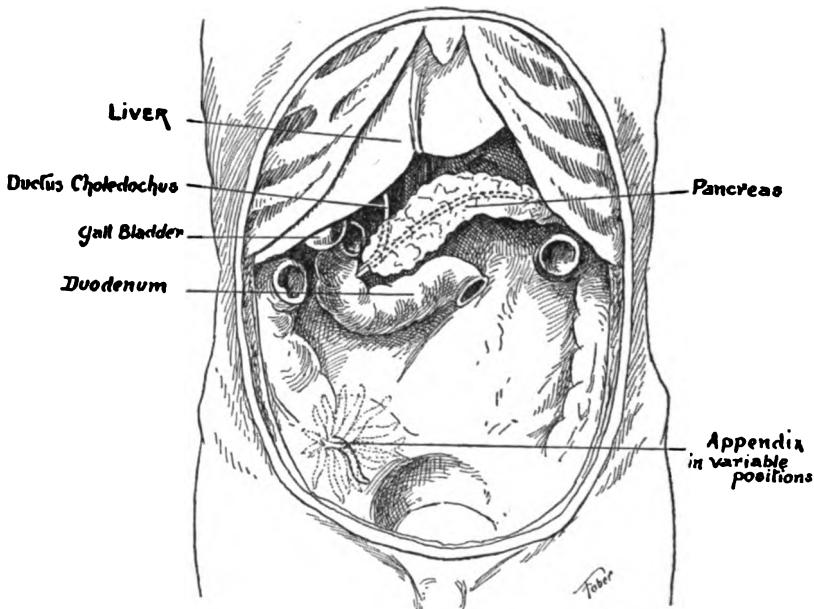


Ampulla of Vater and ducts.

descends along and within the right border of the lesser omentum and passes behind the first portion of the duodenum to the level of the pancreas. From this point it may pursue one of two courses in its relation to the pancreas, either passing between the pancreas and the descending portion of the duodenum, or passing through the head of the pancreas, part of the way by the side of the pancreatic duct. It usually goes by the latter route. Emerging from the pancreas, the two ducts pass side by side to the duodenum and then unite and pass diagonally through the wall of the descending duodenum and open into a common pouch, the ampulla of Vater, which empties into the duodenum (Fig. 1). Sometimes, however, the two ducts pass separately entirely through the wall of the duodenum. The bile-ducts are quite distensible, but the opening of the ampulla is not so distensible. The

most important effects which the mechanic construction of these parts has on function are, first, that when the two ducts empty into the ampulla their secretions normally mix and pass into the duodenum, but abnormally the secretion of one gland may pass from the ampulla up the duct of the other gland; and, secondly, that when the common bile-duct passes down inside of the head of the pancreas it may become occluded by pressure when the head of the pancreas is swollen, and disturbances in the common duct may easily affect the duct and

FIG. 2.



Position of abdominal organs.

head of the pancreas. The consideration of the anatomy shows that pressure over the pancreatic region of the abdomen during biliary massage would guard against the passage of bile from the ampulla into the pancreatic duct (Fig. 2).

The prime indication for massage of the gall-bladder is cholecystitis. Although I believe that most cases of this disease may be thoroughly treated by massage, the very severe cases may require laparotomy. It will be interesting to ascertain in how severe cases massage will be curative, and I hope that surgeons who see many severe cases will study the question. Cases of mild and moderately

severe cholecystitis are probably more frequent than is supposed, and in these cases massage is often ideal treatment.

The effectiveness of massage in cholecystitis is shown indubitably by two facts: the patient manifests, more or less, the immediate effects of the evacuation of the contents of the gall-bladder, and after continued treatment he manifests fewer and then no symptoms of bladder inflammation.

After the initial treatments massage should be practised two or three times daily, according to the severity of the case, until the case seems to be about well, and then massage should be continued once daily for several months. Although during the late course of the disease there may be no manifestations of its presence, it is probable that there is some infection remaining and the mucous membrane at the outlet is still sufficiently swollen to prevent good drainage. The regular treatments should be given about an hour after meals, for the passage of pancreatic juice down the pancreatic duct at that time will tend to prevent the expressed infected bile from passing by way of the ampulla up the pancreatic duct, acting thus on account of its secretory pressure and perhaps on the principle of a mercury air-pump. The first treatments should preferably be given while the pancreatic juice is flowing and when the stomach has almost emptied its contents, and should be followed by a brisk saline cathartic and plenty of water. The transabdominal pressure already mentioned is more important after the early treatments than after the later ones. Of course, when the tissues of the gall-bladder are thought to be so rotten that massage might burst it, laparotomy offers the only means for relief. On the other hand, massage sometimes offers a method of treating cases who are not in physical condition to undergo an operation.

Shall massage be used when there are calculi in the gall-bladder or ducts? One would be inclined at first to declare that it should not. It might be supposed with some good reason that massage of a gall-bladder containing calculi would always be injurious. On the other hand, much pressure on gall-bladders containing calculi is habitually made in many people who are performing lifting movements in which intra-abdominal tension is much increased. (By the way, it is probable that heavy lifting with resulting increased intra-abdominal pressure may be in some cases an etiological factor by causing duodenal contents to pass up the ducts to the bladder, and may in other cases be a remedial factor by driving the infected bile

into the duodenum, the particular direction in which either fluid passes being determined by the resultant force engendered by the differential pressures developed within the abdomen by external muscular action. The great frequency of calculus formation during pregnancy may be due to the greater pressure in the lower abdomen and to the damming of the duodenum by the uterus, which forces the duodenal contents to set back into the ducts and bladder.) Furthermore, the calculi are smooth and faceted and do not cut the mucous membrane. But, although massage might not be particularly injurious, one would obviously not be justified in using it when the stones are too large to be pressed through the passages, and such treatment might increase the percentage of cancers which develop in calculous gall-bladders. But when it can be reasonably determined that the stones are small enough to be pressed through the passages massage is good treatment. Of course, the selection of suitable cases for massage, therefore, involves nice diagnosis, but a very careful history of a case may make it possible to form a good idea of the age and size of the stones. We may remember that the ducts are quite distensible, although the opening of the ampulla of Vater is less distensible. We should consider to what extent any existing inflammation may obstruct the normal calibre of the passages, including the outlet of the bladder. In a general way, we may with considerable safety divide cases of cholelithiasis into the recent and the late cases, the former being remedied by massage and the latter by operation. And, although I believe that gall-stones may form without a concomitant inflammation, they probably very rarely form without inflammation. Indeed, if most cases of inflammation of the gall-bladder would receive treatment by massage most calculi would be expelled while they exist as mere sandy particles. People having discomfort in the region of the gall-bladder would do well to seek advice and treatment early.

Although it is not within the province of this article to consider the complex matter of the diagnosis of the various diseases of the upper abdomen, I wish to call attention to certain manifestations of one symptom of gall-bladder disease which are sometimes valuable. When the patient complains of having at times colicky pains in the region of the gall-bladder, even if on examination he has no suggestive tenderness anywhere, direct him, the next time he has the pains, to feel along the middle of his right costal arch, and if the pain is a

referred one caused by contraction of the gall-bladder he will find this superficial region more or less tender. The doctor can often elicit this pain by having the patient drink some cold water. The cold stimulates the bladder to contract and causes the pain. Also, if the patient lies, especially in the early morning, on his abdomen along the line of the gall-bladder he may feel a dull discomfort or a sharp pain limited to the region of the bladder.

Massage may be used to assist a stone lodged in the ducts to pass into the duodenum. As a matter of fact, most stones which leave the gall-bladder enter the ducts and pass through without assistance. When a stone is in the ducts and the patient is suffering the throes of colic, massage will sometimes drive the offensive body into the duodenum. Unfortunately, under such conditions, massage can be administered with difficulty, and should not be attempted until a dose of morphine has been given to relieve the pain and to relax the spasmodic contraction of the ducts. Indeed, nature effects a massage in such cases by causing paroxysmal contraction of the abdominal muscles and the diaphragm in repeated acts of vomiting. But by relaxing the ducts with a dose of morphine and then applying voluntary massage the stone can pass more easily. If morphine is contra-indicated, a milder antispasmodic and a hot bath may relax the parts so that massage can be applied. Stones lodged at some point in the ducts, giving rise to symptoms of chronic impaction, may sometimes be made to move on by massage. Of course, any stone in the ducts which cannot be made to pass into the duodenum by nature or by massage should be treated through a laparotomy wound, the stone being pushed on by manipulation or cut out.

As the person who looks after the massage in diseases of the gall-bladder and ducts should have both a good knowledge of these diseases and also a good knowledge of other diseases, particularly those which must be differentially diagnosticated, as gastric ulcer, duodenal ulcer, abnormal adhesions, pancreatitis, appendicitis, cancer, peritonitis, renal diseases, heart-disease, empyema, abscess of the liver, subphrenic abscess, etc., it should be self-evident that no one except a doctor of medicine should have charge of the treatment of these diseases.

It is agreed that the great majority of patients having some form of pancreatitis have also disease of the gall-bladder or ducts, and it is also agreed that the latter bears a causal relation to the former on

account of the intimate continuity and contiguity of the tissues involved. We should infer, therefore, that the treatment of diseases of the gall-bladder and ducts by massage or operation would be prophylactic against pancreatic disease. Although, so far as anatomical structure is concerned, infection from the duodenum would seem to be able to pass as easily up the pancreatic duct or ducts as up the common bile-duct, there is no doubt that pancreatic disease is not caused as often in this way as is biliary disease, the difference in apparent vulnerability probably being due to the antiseptic action of the pancreatic secretion on duodenal contents. On the other hand, it should be recalled that it has been shown that not only infected bile, but also bile that is free from infection, can cause serious inflammation of the pancreas. However, in any case of pancreatic disease one should look for disease of the biliary apparatus and give it needed simultaneous treatment. Not only does treatment of the biliary apparatus largely remove the cause of pancreatitis, but treatment of the pancreas relieves the swelling of its head, which is making pressure on the common duct and is thus aggravating the biliary disease. That is, to speak generally, treatment of both the pancreas and the biliary apparatus in pancreatic disease is of benefit not only to each individual organ, but also reciprocally to the other organ. The particular treatment which should be applied to any case of pancreatitis is not always readily determined, especially in the acute form of the disease, the exigency of which is apt to be so great. Future results must point out more certainly indications for massage and operation.

As time is an important element in acute pancreatitis, massage possesses the advantage of speedy application. When, in an acute case, abdominal tenderness is not too great, massage may be tried, especially if there is no possibility of having an early operation. It may drive a stone from the common duct or the ampulla and re-establish free drainage of bile and drain the pancreatic ducts, or, if cholecystitis or cholangitis exists without stones, it will probably drain both the biliary apparatus and the pancreas and bring the attack to an end. In other words, massage may accomplish all that operation can, and, if it does not, operation can be resorted to if possible. Even if massage does not drive out existing stones, it may force the secretions and abnormal fluids of the two organs past the obstructing stones so as to bring the acute crisis to a close, and then, as the swelling of the tissues subsides, continued massage may be able to remove the

stones, or, if not, the patient is in better condition for an operation than during the crisis. When pancreatitis is not accompanied by stones or inflammation anywhere in the biliary apparatus, when, for example, a duodenitis is closing the opening of the ampulla, massage will be ample and entirely curative.

The question arises whether the pressure of massage would cause a spreading of destructive processes in the pancreas. It is hardly probable that necrosis could be forced beyond the parts that have already become rotten. At all events, such a result could follow only when the ampulla of Vater is entirely blocked, for, if the ampulla is not blocked, the pressure would doubtless propel the fluid along the duct into the duodenum. Massage would be equally applicable whether the disease is confined to the head, particularly the portion between the duct of Wirsung and the duct of Santorini, or extends into the body and tail. As pancreatitis has a large mortality rate, one should not ascribe to the fault of any particular method of treatment the mortality which the disease also yields under other methods of treatment.

In acute pancreatitis massage may be performed as in biliary disease, particular attention being given by the doctor to pressure on the head of the pancreas in general and behind the ampulla in particular to dislodge a possible stone. Direct digital massage may be applied to the ampulla by having the patient exhale and relax his abdominal muscles, but it should be applied gently. If the patient can coöperate, one may use a method which I have devised for making deep abdominal palpation and massage. The patient exhales both tidal and reserve air. He tightly contracts the abdominal muscles and at the same time expands as far as possible the whole, but particularly the lower, thorax. These movements push and draw the movable abdominal contents up into the thorax as far as possible. The patient then relaxes the abdominal muscles, and deep palpation can usually be made with remarkable facility. The patient respires a minimum amount of tidal air, using the top of the lungs only. If, with each superficial inspiration, he will tighten the muscles which expand the thorax, the phase of inspiration will afford the best period for the most accurate palpation. If relief follows the first treatment, massage may be continued with such frequency and for so long a time as required.

In the case of acute pancreatitis it is again necessary to make

differential diagnosis, which is often apt to be difficult, even to a well-informed doctor of medicine, who must consider perforation of a gastric or a duodenal ulcer, intestinal obstruction, acute peritonitis, appendicitis, gall-stone colic, strangulated hernia, occlusion of the superior mesenteric artery, etc.

Massage is more applicable to chronic than to acute pancreatitis. The general urgency of the case, and particularly the pain and tenderness of the patient, are not so prohibitive of this method of treatment in the former. Indeed, the long course and the rather frequent occurrence of chronic pancreatitis make massage a most desirable method of treatment. Stones may be expelled from the biliary apparatus and the products of inflammation from both organs and the tissues given an opportunity to heal. The probability of occlusion of the outlet of the ampulla by a duodenitis should be considered and the condition treated if indicated. A history of alcoholism would raise at once the question of a causative duodenitis. (Pancreatitis of non-infective origin, unlike cholelithiasis, is somewhat more frequent in men than in women.) Massage should be used not only during the paroxysms, but also during the intervals, and, in fact, should be continued for a considerable time after all symptoms disappear. If at any time there are indications that massage is not producing effects which could probably be produced by operation, as the removal of firmly-fixed stones, operation should, of course, be performed. As with the acute form of the disease, the nature of chronic pancreatitis must be borne in mind, lest the method of treatment be blamed unjustly. Occasional cases of the chronic form during an exacerbation suddenly become acute without any treatment. It is possible that massage might hasten such an episode, as by pushing into the ampulla a stone which is too large to pass through its opening and therefore becomes impacted in it and directs the bile into the pancreatic duct. Of course, massage is best suited to those cases in which there are no stones or the stones are small. If stones are known to be present, and it is supposed that they may possibly be large enough to precipitate acute pancreatitis, the patient or representatives may be informed of the matter and allowed to select the treatment. Massage in the chronic form should be performed as in the acute form. In connection with chronic pancreatitis, the importance and difficulty of differential diagnosis should again be emphasized.

A certain transitory condition characterized by discomfort or

pain above the umbilicus is undoubtedly a disturbance in the pancreas. The pain is thought by the patient to be in the stomach, and the condition may be called stomach-ache, indigestion, gastralgia, etc. This condition probably occurs not at all infrequently. It is undoubtedly caused by the entrance into the pancreatic duct of bile or duodenal contents. It is brought to an end by eating, the freshly-secreted pancreatic juice washing out the intruding fluid into the duodenum. It is preferably and quickly relieved by gently massaging over the pancreas while the abdomen is relaxed.

Massage is valuable in certain disturbances of the vermiform appendix. Distention of the appendix with gas is an uncomfortable and sometimes very painful condition which may be mistaken for appendicitis. The distention of any part of the alimentary canal, especially the thin-walled appendix, with gas is uncomfortable, independent of the presence of inflammation. Early in my practice I saw a case in which the cæcum and appendix were the most distended with gas of any case that I have ever seen and the patient had been told that she had appendicitis and must have an operation. Fecal concretions which cause appendicular colic or discomfort may be removed by massage, and this is quite an important matter, for I believe that they are frequently the exciting cause of appendicitis. The larger they become the more difficult, of course, it is to press them through the appendicular orifice. Severe colic or discomfort, also, should not be mistaken for appendicitis. In case of gas distention it is well to begin by massaging the colon along the upper area of the distention and then carry the massage nearer to the appendix, making each stroke, of course, always in the direction of the bowel,—that is, away from the appendix. (The colon and rectum may first have to be emptied of faeces.) When the appendix is reached by the massage it will probably be relieved, and, if it is not, it may be massaged as presently to be described for concretions. In case of appendicular colic or discomfort, the bowel below should first be emptied. In massaging the appendix itself certain anatomical facts should be kept in mind, particularly that the orifice of the appendix usually lies about under McBurney's point, and that the appendix may extend in one of several directions from this point. In appendicular colic or discomfort the position of the appendix can often be quite definitely determined by its suggestive tenderness under exploratory palpation, and massage can then be applied to it directly. When the position

of the appendix cannot be determined massage should be made seriatim along the radii corresponding to its possible positions. Each stroke of the massage may be made after the patient exhales and while he holds the breath out, relaxing the abdominal muscles as well as possible. The method much to be preferred, however, is my method of deep palpation and massage already described. The fingers of the massaging hand should be placed six or eight inches, or as far as possible, away from McBurney's point and with as deep pressure as advisable drawn toward the point. Massage may be made more efficient by making of each radial stroke a series of interrupted strokes, removing and advancing the hand as often as deep palpation cannot be satisfactorily made. This massage is often applicable to chronic appendicitis, and if one could see cases of acute appendicitis when there is no danger of perforation and before there are much tenderness and rigidity it would probably relieve some cases in which the purulent contents of the lumen could be pressed into the cæcum, and the process could be repeated until resolution has taken place. It is a question whether one would be justified in administering an opiate to relieve pain and rigidity so that he might massage the acutely-inflamed appendix. Perhaps he would be if he could be quite sure that the tissues are not rotten. Perhaps some cases could be cured in this way if the orifice of the appendix is still patent.

Now, doctor, as you have read this article, I should like to ask whether you see in it only some ideas which are not absolute in practicability, or whether you see chiefly some ideas which are of undoubted practicability, and some ideas of possible practicability. Please do not imagine that this article is claimed to be a final, summary dissertation on the treatment of the various forms of the diseases considered, and please do not blame me for not furnishing a means for the solution of calculi and concretions and for the reintegration of rotten tissues. In short, do not blame me for not having performed a miracle! The scope and adequacy of any method of treatment, whether drug, mechanical, hydrotherapeutic, surgical, psychic, or what-not, are matters of knowledge which are usually gradually ascertained over a long time by many observers. This article only touches many points which it is hoped you will help to study, and it presents many points which are of the greatest positive value in treating numerous people, particularly those who are seen during early symptoms.

THE VALUE OF THE X-RAY EXAMINATION IN THE DIAGNOSIS OF GASTRIC CANCER *

BY JAMES T. CASE, M.D.

Battle Creek, Michigan

Röntgenologist and Assistant Surgeon to the Battle Creek Sanitarium; Röntgenologist to St. Luke's Hospital, Chicago; Professor of Röntgenology, Northwestern University Medical School, Chicago

WHEN a suspension of some salt opaque to the Röntgen ray is introduced into the empty stomach, the lumen of the stomach, if normal, presents a characteristic complete shadow, subject to certain normal indentations. These normal indentations are as follows:

a. The splenic notch, usually present at the upper border of the greater curvature, due to the pressure of the spleen against the greater curvature. One may judge thereby as to the size of the spleen.

b. The changes in shape of the stomach shadow produced by the peristaltic waves are varying but characteristic, and are easily recognized under the fluorescent screen or by a series of röntgenograms.

c. The pyloric sulcus, the break between the shadow of the stomach and the shadow of the first portion of the duodenum (variously termed *bulbus duodeni*, *duodenal bulb*, *stomach cap*, *pileus ventriculi*), normally about one centimetre in width.

Excluding these normal indentations in the shadow of the stomach, any defect in the shadow must be regarded as suspicious of malignancy, and its identity determined. In favorable subjects where the fluoroscopic image is clear the screen study of the contour of the gastric *silhouette* is very satisfactory, although the writer, for the sake of absolute safety from criticism, usually makes several röntgenograms as a matter of record, even in the cases satisfactorily studied by the screen method. In heavy patients ten or twelve röntgenograms usually suffice. On a number of occasions unsuspected gall- and kidney-stones have been discovered in this manner, and in patients too heavy for favorable fluoroscopy the serial röntgenograms have made possible the discovery of relatively early car-

* Read before the Chicago Medical Society, October 14, 1914.

cinoma. The reason for the use of the term "relatively early" will appear later in this paper in the discussion of the possibility of negativing a diagnosis of carcinoma.

In the effort to render possible an earlier diagnosis of gastric cancer than he had till then been able to make by the recognition of filling defects in the stomach shadow, Holzknecht grouped a number of radiologic and clinical signs under various heads, each one a "symptom-complex." The following symptom-complex relates to gastric carcinoma:

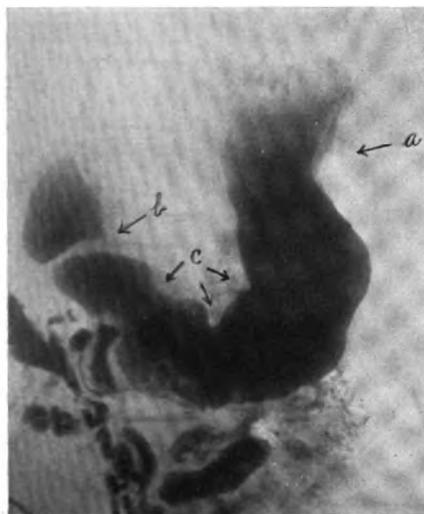
1. Bismuth residue six hours after the Rieder meal.
2. Normal shadow of the stomach seen on the screen.
3. Achylia.

Diagnosis: A small carcinoma of the pylorus."

In the symptom-complex noted above the reasoning is as follows: (1) Achylia is always associated with hypermotility so long as the pylorus is free, the stomach emptying in two or three hours; (2) therefore, a residue after six hours must mean an organic obstruction, because (3) spasm of the pylorus is never associated with achylia, but with hyperacidity.

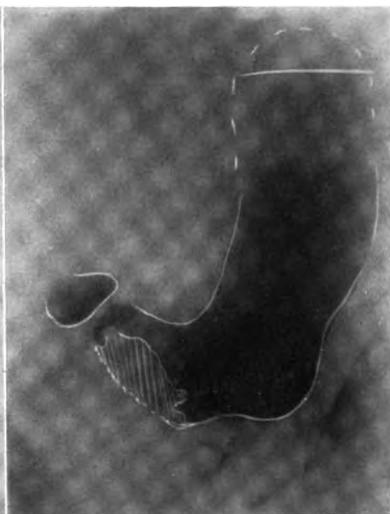
The writer refers to the above symptom-complex of Holzknecht only to warn against its unreliability, for, while it is true that in a certain number of cases such reasoning might lead to the recognition of an early pyloric neoplasm, the same reasoning in many other cases will lead to ignominious failure. The writer has seen cases fitting perfectly into the above symptom-complex which at operation proved to be not malignant, but due to adhesion bands, pressure of extra-ventricular masses or gall-stones, and sometimes no pathology at all could be demonstrated at operation. The writer is thankful that he was able to test out this matter in a manner which did not reflect unfavorably upon himself or the surgical staff through whose courtesy the rigid check-up was possible. Thanks to a routine which requires that all patients about to be subjected to laparotomy in the surgical department of the Battle Creek Sanitarium be first submitted to a thorough bismuth-meal examination of the entire gastro-intestinal tract, the writer has been able to check at operation the Röntgen findings in hundreds of cases. For instance, in a patient operated upon for uterine fibroids, the surgeon, as a routine procedure at operation, examines and records the condition of the gall-bladder, the pylorus,

FIG. 1.



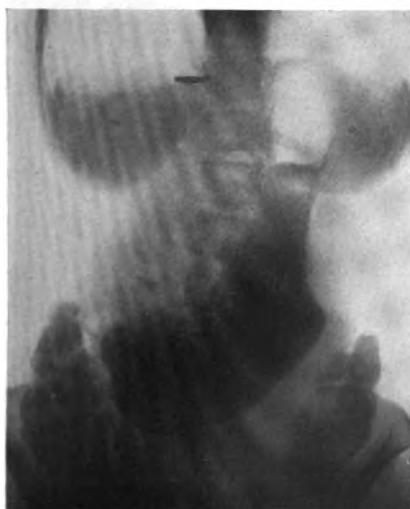
A normal stomach, patient prone, plate anterior. (a) The splenic notch in this case somewhat exaggerated by a collection of gas in the splenic flexure; (b) pyloric defect; (c) peristaltic waves.

FIG. 2.



Carcinoma of the stomach, semi-diagrammatic. The filling defect due to the carcinoma on the greater curvature is sketched in.

FIG. 3.



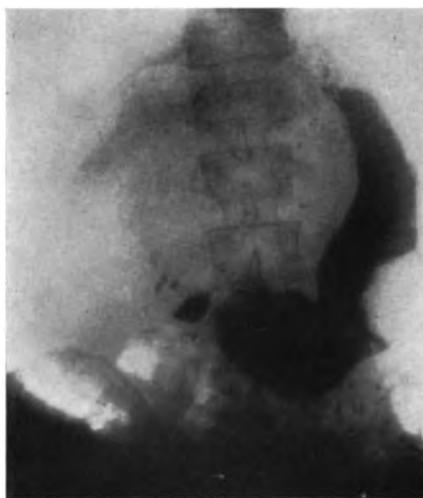
A large splenic notch, indicating enlargement of the spleen.

FIG. 4.



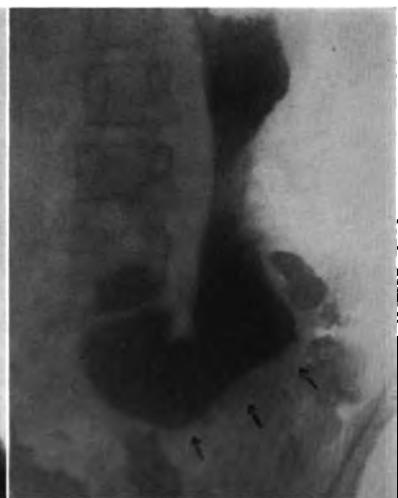
Filling defect on the greater curvature due to extraventricular pressure (elongated spleen).

FIG. 5.



Filling defect on the greater curvature due to carcinoma.

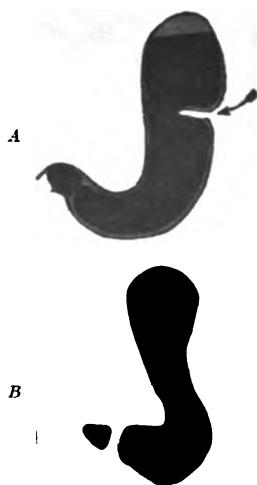
FIG. 6.



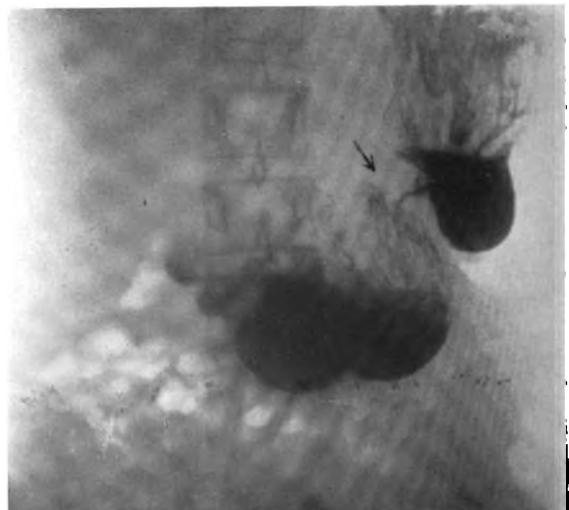
Filling defect in the lower part of the greater curvature due to a large tuberculous ulcer. It will be noted that the gas and bismuth-filled splenic flexure also distorts the stomach shadow high up on the greater curvature.

FIG. 8.

FIG. 7.



Diagrams illustrating the difference between the hour-glass of ulcer (a) and the hour-glass of carcinoma (b).



Hour-glass stomach due to penetrating ulcer on the lesser curvature at point shown by arrow.

the duodenum, the appendix, the terminal ileum, etc., so that, without working inconvenience to any one, the pre-operative Röntgen findings, negative or positive, even though not directly relating to the object of the operation, are corrected and future errors minimized. From his experience thus secured the writer seldom relies upon the symptom-complex method of recognizing gastric carcinoma.

As a matter of fact, the symptom-complex method is unnecessary, since serial röntgenography and, when necessary, bio-röntgenography afford us a means of studying intimately the contractility of the entire gastric wall, and of excluding even very small indurating lesions. The writer would not presume to state that carcinoma of the stomach could not exist in a lesion too small for detection by carefully-conducted röntgenographic search, but he will place on record the statement that up to the present moment, since the time he was fitted by equipment and experience to make these thorough studies, not a single case of carcinoma of the stomach, to his knowledge, has been revealed at operation where previous Röntgen examination had failed to show an organic lesion. There are cases, particularly the early cases, where, from the X-ray examination alone, one may only say that there is a mass, without venturing an opinion as to whether it is due to ulceration with inflammatory reaction or to malignancy. One must also think of syphilitic and sarcomatous lesions, and the possibility of having to deal with a tuberculous mass. The writer has in one instance successfully diagnosed a tuberculous ulcer of the stomach.

A careful study of the gastric *silhouette* by means of the fluoroscope and a series of röntgenograms should then permit a positive or negative opinion as to the presence of a filling defect. This filling defect may be characteristically irregular, indented as by finger-prints, or otherwise definitely suggestive of carcinoma without the corroboration of other clinical findings, but as a routine all the evidences of clinical research, including the Abderhalden test, will be added to the Röntgen findings if one would make an ideal study of the case.

The gross filling defect produced by a tumor of the lower half of the stomach on the greater or lesser curvature is usually obvious, as shown in the accompanying illustrations. The characteristics are as follows:

1. Permanence. The filling defect is of the same size, in the same

location, and of the same identical shape and outline at the various observations.

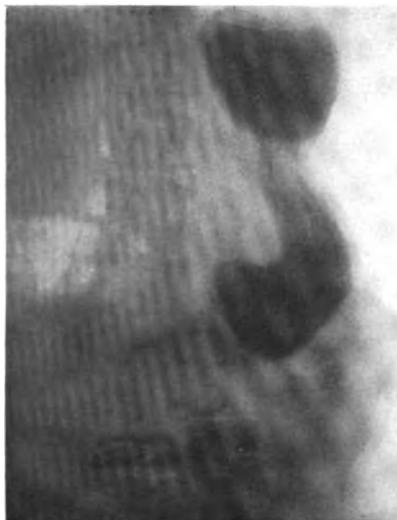
2. The filling defect usually coincides with a point of tenderness on pressure, or, if the entire epigastrium be tender, with the point of most marked localized pressure-pain. The absence of a pain-point does not at all negative the seriousness of a filling defect.

3. Screen examination as well as serial plate examination will show that the peristaltic waves fade out as they reach the region of the filling defect; and, provided it is not too near the pylorus, the waves reappear beyond the defect, proceeding to the pylorus. An inflammatory mass associated with ulcer may give rise to this same phenomenon.

4. When the lesion is near the pylorus, even though not directly producing stenosis, antiperistaltic waves may be observed. These are seldom recognized on plate examination, but if repeated fluoroscopic observations are made, at some time or other, in every case of organic pyloric obstruction, antiperistaltic waves are likely to be observed; when seen they are pathognomonic of an organic lesion. Here again the evidence does not necessarily speak for malignancy, but with a filling defect antiperistalsis is exceedingly suggestive of malignancy.

5. Unless there exists actual mechanical obstruction due to narrowing of the lumen of the stomach, there is usually early clearance of the stomach contents in a manner characteristic of achylia. This is a point in the differential diagnosis between benign and malignant hour-glass stomach. In ulcer cases the emptying time of the stomach is usually normal or even prolonged. Even in pyloric carcinoma there may be a pyloric insufficiency, the action of the sphincter being hindered by the induration of the gastric walls before the extension of the tumor growth has produced actual stenosis. In such cases, even though a moderate grade of gastric acidity still exists, clearance of the stomach contents may take place with unusual rapidity. So soon as pyloric stenosis is produced, however, the symptoms are those of gastrectasis. The peristaltic waves are increased in depth, at times almost cutting the gastric shadow in two; the waves are increased in frequency, and begin higher up in the stomach; and, if one be fortunate, antiperistaltic waves may be recognized, especially after digital manipulation of the stomach through the abdominal wall, or after

FIG. 9.



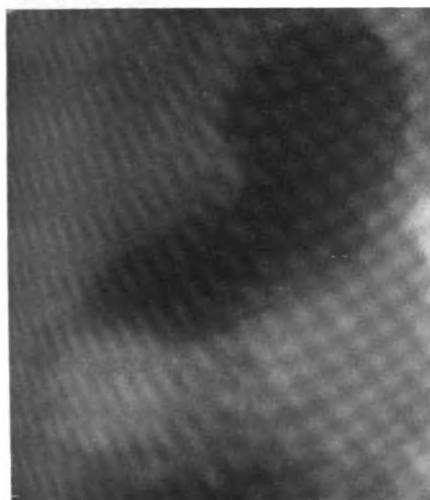
Hour-glass stomach due to an annular carcinoma just above the middle of the stomach.

FIG. 10.



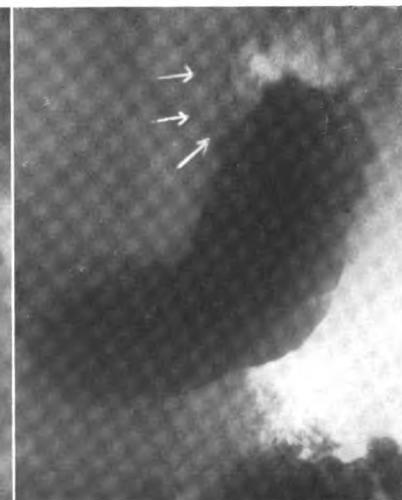
Hour-glass stomach due to carcinoma implanted upon the base of an old lesser curvature ulcer.

FIG. 11.



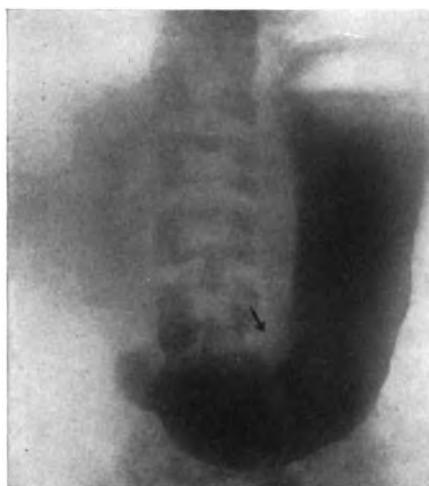
Infiltrating scirrhous carcinoma involving practically the whole stomach.

FIG. 12.



Carcinoma high up on the lesser curvature near the cardia.

FIG. 13.



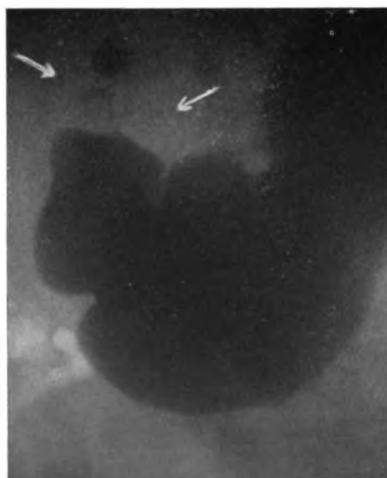
Carcinoma on the lesser curvature near the middle of the stomach.

FIG. 14.



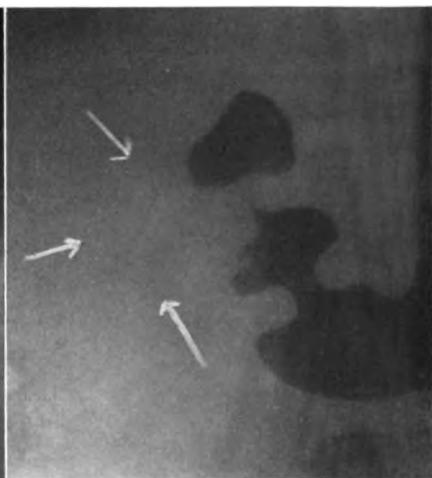
Annular carcinoma at the pyloric end of the stomach. (p) pylorus; (c) area of carcinoma.

FIG. 15.



Annular carcinoma of the pars pylorica.

FIG. 16.



Gall-stones. The first part of the duodenum is well filled out in its characteristic manner. A peristaltic wave is constricting the pars pylorica. Perhaps an inch and a half from the pylorus, between the peristaltic wave and the pylorus, the greater curvature is made irregular by adhesions to the gall-bladder. The outline of the stones shows faintly.

the patient has taken several gasping breaths. Antiperistaltic waves are best seen an hour or two after the ingestion of the meal.

The determination of the extent of a gastric tumor and the probability of adhesions to neighboring organs, as well as the identification of pain-points on pressure, can be accomplished satisfactorily only by palpation under the fluorescent screen. A wooden spoon of special design is very helpful in this manipulation, though, in the writer's opinion, it is practically safe to use the hand for this purpose, provided it is protected with a heavily-leaded glove. If there are evidences of fixation to neighboring organs, the probable extent of the tumor may be inferred.

Ordinarily when the tumor does not produce pyloric stenosis the test meal will pass quickly through the stomach and quickly through the small intestine into the colon. If the bismuth, having reached the small intestine, is gathered here and there in large, ropy masses, arriving at the cæcum later than would be expected in such a case, one may, in the presence of definite evidences of gastric carcinoma, properly suspect a peritoneal carcinomatosis. The writer has seen this in several cases of infiltrating scirrhouss carcinoma of the stomach, one of which is shown in the accompanying illustration. A study of the contour of the upper surface of the liver—the phrenohepatic shadow—may, in advanced cases of carcinoma, give information as to whether or not metastasis has occurred into the liver. The contour of the right diaphragm is easily studied by the screen method, the patient and the tube being variously adjusted in order to show up the entire upper surface of the liver.

Symptoms of œsophageal obstruction are frequently found in cases of gastric carcinoma. These symptoms may be due to the backing up of food into the œsophagus from a stomach whose lumen is much reduced through carcinomatous involvement or through enlargement of the liver owing to metastasis. This is not an uncommon observation. The food column in the œsophagus may, during ingestion, rise higher than the base of the heart, but usually the pabulum passes into the stomach after a few moments. In cases of actual invasion of the cardia the usual signs of œsophageal obstruction are present.

In this connection it is proper to urge the importance of making a complete gastro-intestinal Röntgen examination in every case of suspected carcinoma of the stomach, in order to rule out, if possible,

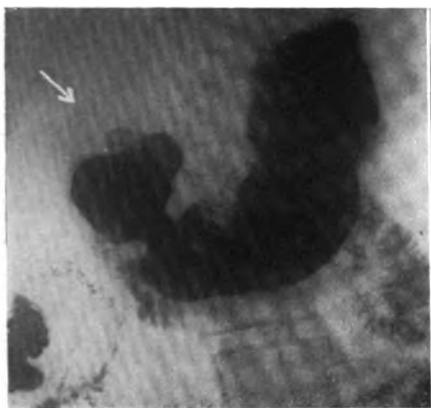
extension to or metastatic involvement of other organs. The finding of metastases, especially those occurring in the pouch of Douglas, may permit a differentiation between a filling defect due to ulcer and one due to carcinoma. It should be more generally recognized by röntgenologists that examination of the lower bowel may reveal evidences of the so-called "Douglas metastases," though, on account of the easy accessibility of the rectum for digital exploration, physical examination is also very useful.

In differentiating between benign cicatricial stenosis of the pylorus and stenosis due to malignancy the writer has found it of especial value to make the screen and plate examination with the patient lying on the right side, the tube behind the patient, and the screen or plate held vertically against the abdomen. In this manner it is possible to bring out the finest detail of the pyloroduodenal region, often to better advantage than with the patient in the prone position, plate anterior. Unless the pyloric carcinoma has supervened upon an old stenosing ulcer, it is likely that the stomach will not be greatly dilated in pyloric cancer, for the reason that the malignant process has advanced too rapidly to permit extensive dilatation. In benign ulcerous stenosis, on the other hand, including those cases where the ulcer has later degenerated into malignancy, the long duration of the process permits enormous increase in the size of the stomach.

Extraventricular tumors, unless intimately adherent to the stomach, may be differentiated through the fact that the normal gastric peristalsis is not interfered with. This is best determined by fluoroscopy, although the expenditure of a number of plates may afford the same information.

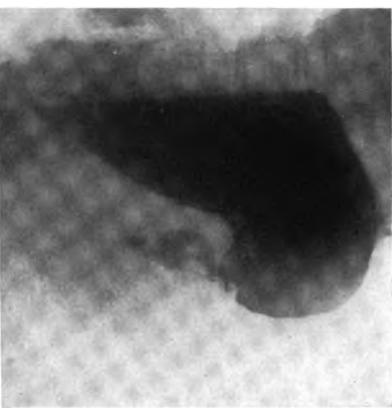
In differentiating between hour-glass due to ulcer and that due to carcinoma there are several important points to be observed. Ulcer and carcinoma show differences in position, length and outline of the connecting canal between the upper and lower sac, as well as in the relative size of the two sacs. The ulcer or its scar is almost always located on the lesser curvature. The writer has seen but one case of ulcer high up on the greater curvature, in that instance penetrating into the spleen. The contraction associated with lesser curvature ulcer always occurs toward the lesser curvature, the seat of the shrivelling agent. The connecting canal between the upper and the lower sac is located near the lesser curvature, and its outlines are

FIG. 17.



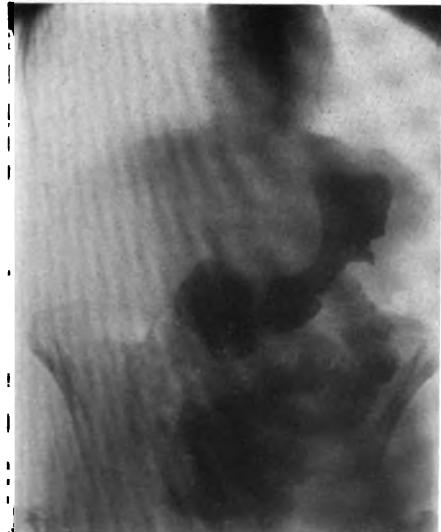
Case clinically diagnosed carcinoma which proved to be gall-stone. One laminated gall-stone shown just above the pyloric antrum.

FIG. 18.



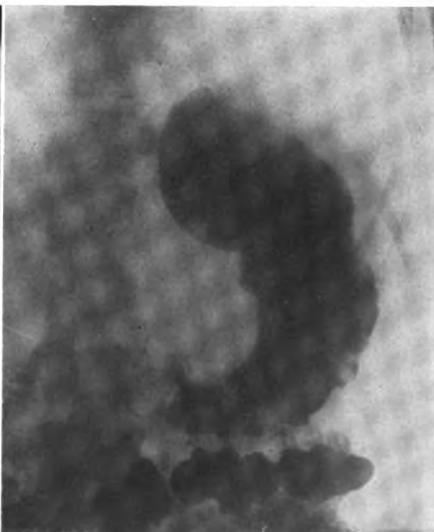
Röntgenogram made with the patient lying upon the right side, plate anteriorly, tube posteriorly. The pylorus is thus the most dependent part of the stomach, and small filling defects are better shown. This röntgenogram shows very well the nature of a carcinomatous filling defect.

FIG. 19.



Extensive carcinoma on the greater curvature not involving the pylorus. Note the unusual filling of the duodenum and of the small intestine, owing to pyloric insufficiency.

FIG. 20.



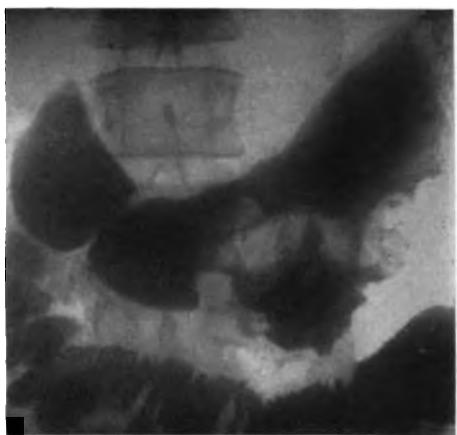
Extensive carcinoma of the lesser curvature.

FIG. 21.



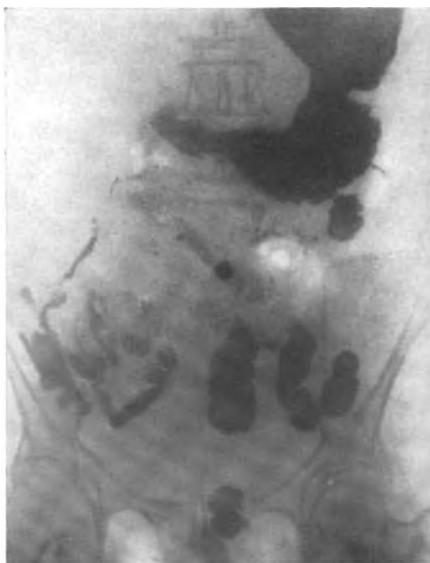
A deformity of the stomach simulating carcinoma of the lesser curvature. In this case it is due to extraventricular (hepatic) pressure. Peristaltic waves shown at arrows.

FIG. 22.



Extensive carcinoma of the greater curvature.

FIG. 23.



Infiltrating scirrhus of the stomach. General peritoneal carcinomatosis producing small intestine stasis.

FIG. 24.



Filling defect of the greater curvature due to retroperitoneal sarcoma, simulating the defect of carcinoma.

usually nearly smooth and regular. There is often a slight projection of the stomach shadow at the site of the ulcer, owing to excavation attending the ulcer process. In ulcer only a limited portion of the greater curvature is pulled over toward the ulcer; the narrowness seldom affects the greater curvature for more than half an inch. In carcinoma, on the other hand, although the tumor usually starts on the lesser curvature, it produces there a light space (filling defect), and the connecting channel between the upper and the lower sacs is located near the greater curvature. When the malignant hour-glass is produced by an annular carcinoma, the lumen between the two sacs occupies a median position, lying in the axis of the stomach. The length of the carcinomatous narrowing is greater than with ulcer, unless the ulcer has been attended by perigastric adhesions of considerable extent, or unless the ulceration has been multiple. The contour of the filling defect is irregular and often indistinct, because the wall of the stomach is infiltrated. In ulcer the pathological findings occur opposite the site of the filling defect, while in carcinoma there are resistance, often pain, and sometimes a palpable tumor corresponding with the filling defect.

Differentiation between the hour-glass of ulcer and of carcinoma is helped by a consideration of the relative size of the two sacs. This relative size depends upon the relative position of the hour-glass constriction to the pylorus, upon the degree of constriction, and upon the condition of the pylorus. The greater the constriction and the nearer the constriction to the pylorus, the greater will be the size of the upper sac. The size of the lower sac, which is of greatest differential diagnostic importance, depends upon the permeability of the pylorus. A large lower sac exhibiting vigorous peristaltic waves speaks for ulcer, owing to the tendency of the pylorus to abnormal spastic contraction in the presence of ulcer; whereas in carcinoma the absence of free hydrochloric acid with resulting relaxation of the pylorus does not favor development of a large lower sac. Hence we may conclude that in hour-glass stomach, when the two sacs are markedly different in size, and especially when the lower sac is small, this fact speaks for carcinoma.

Holzknecht was one of the first to call attention to the possibility of utilizing the Röntgen examination to draw conclusions as to the resectability of carcinoma of the stomach. Holzknecht is careful to

use the word resectability rather than operability, because metastases to glands can hardly ever be suspected, and adhesions are recognized only with a relative degree of certainty. According to Holzknecht and Haudek, in resectable cases the normal hook form of the stomach is usually preserved, while the types of tumor cases which are not resectable show the diagonal, short, small form of the stomach. Even very large tumors requiring a subtotal resection are usually still resectable if they preserve the hook form. Another symptom of resectability is the preservation of the distensibility of a considerable portion of the stomach. One should not neglect study of the phreno-hepatic shadow and of the remainder of the gastro-intestinal tract, especially the pouch of Douglas, before reaching conclusions as to operability.

In a certain small class of cases where the clinical examination warrants a reasonable suspicion of malignancy, and where the Röntgen findings are negative, it is wise to repeat the Röntgen examination after four or five weeks. In a few cases the second examination has revealed evidences of malignancy not made out earlier; in the majority of cases the negative diagnosis will be strengthened. One of the most useful purposes of the Röntgen examination in this class of cases, as well as in cases of inoperable malignancy, is to save the patient from an unnecessary exploratory operation.

A paper on this subject would be incomplete without reference to a paper by White and Leonard, entitled "X-ray Evidence in Early and Latent Cancer of the Stomach" (*Boston Medical and Surgical Journal*, October 1, 1914). Their study includes 114 hospital and private cases examined within a year and a half by clinical and X-ray methods in which cancer of the stomach was suspected and found. In forty cases cancer was ultimately proved and in sixty cases ultimately ruled out. Eight cases remained doubtful. Thirty-three out of the forty cases of cancer were excluded from the paper as being well developed, leaving eighty-one cases of early, latent, or suspected cancer. These eighty-one cases finally were diagnosed as one early, six latent, sixty-two carcinoma ruled out, and twelve doubtful. The one early and six latent cases were confirmed by operation. In not a single case of the sixty-two in which carcinoma was ruled out has carcinoma been found. The twelve doubtful cases

occurred mostly in elderly people, the clinical diagnosis being as follows: in six, ulcer or cancer; in two, syphilis of the stomach or cancer; in two, organic stricture of the cardia, probably cancer; one, adhesions or cancer.

In spite of the assurance which the writer feels is often warranted in making a positive statement as to the absence of malignant disease of the stomach, it is a striking observation that röntgenologists rarely diagnose an early carcinoma of the stomach. It is probably very rare indeed that a case of truly early carcinoma is seen at operation. That the application of the diagnostic points described in the foregoing pages is adequate is attested by the fact that not once in the hundreds of operated patients already mentioned was carcinoma found by the surgeon when the pre-operative Röntgen examination had failed to find an organic lesion; yet not more than a dozen of the gastric malignancies could really be considered as early. With malignant disease of the stomach, the morbid sensations produced by the affection are of such indefinite nature that the patient seeks medical advice only when it is too late for an early diagnosis. And, as Huerter says, even if during the first examination the suspicion of a malignant tumor is forced upon the average examiner, he is seldom willing to express a positive opinion until the programme of watchful waiting has been pursued too long for an early diagnosis. Why not make the Röntgen test a routine procedure in the examination of every case presenting gastro-intestinal symptoms?

As a matter of fact, the majority of cases of gastric cancer do not submit themselves for examination in the early stages of the disease. In the writer's experience, as in that of White and Leonard, most of the patients examined for suspected cancer of the stomach showed either a well-developed lesion, readily found, or else a normal röntgenologic behavior of the stomach, warranting a negative diagnosis of cancer. It is very striking that in the large series of cases reported by White and Leonard, as well as in the writer's own extensive experience, not a single case presenting normal Röntgen stomach findings has proved to be cancerous, although most of them have been followed to operation or to autopsy, or have been watched for at least six months after the examination, in order to verify the results.

Although it is obvious that a very small malignant lesion on the anterior or posterior wall might escape observation, nevertheless it

appears that a carcinoma of the stomach may be almost positively ruled out in patients whose symptoms are of long standing, but whose stomach is röntgenologically normal. With the very careful technic now possible, röntgenologic failures do not occur in the negative diagnosis of carcinoma, but in cases where carcinoma is diagnosed and does not exist. As White has put it, our mistakes have been errors of commission rather than errors of omission. The moral is to recognize the limitations of X-ray evidence. Even in cases where the X-ray examination is not required to establish an already obvious diagnosis of malignancy it renders great aid in locating the lesion and in showing its size and extension to neighboring tissues. At times the X-ray evidence will demonstrate that a carcinoma is small, free from adhesions, and distinctly operable in a case which, clinically, presents such signs as would lead one to expect a large inoperable lesion.

EPITHELIOMA: ITS EARLY DIAGNOSIS AND AN EXCELLENT METHOD OF TREATMENT

BY WM. H. BEST, M.D.

Assistant Visiting Physician, Department of Cutaneous Diseases and Syphilis,
Kings County Hospital; Attending Physician, Polhemus
Dispensary, Brooklyn, New York

ALTHOUGH metastasis and glandular involvement are not so early in epithelioma as in carcinoma elsewhere in the body, its early recognition and immediate thorough removal prevent what is frequently supposed by the patient to be an inoffensive lump in the skin, or an insignificant ulceration, from becoming later the cause of a major operation, with much disfigurement and even loss of life.

Epitheliomata are due to a proliferation of the cells of the stratum mucosum (*rete Malpighii*), which is the lowermost of the four layers making up the epidermis. The lowermost cells of this stratum are columnar with oval nuclei, and are sometimes spoken of as the basal cells. Each superimposed row of cells, however, is less columnar, becoming polygonal with concentrically-placed, round nuclei. The cells of the *rete* contain fine fibrillæ which radiate outward from the nuclei and go beyond the cell margin, crossing the intercellular spaces, and appear to interlock with fibrillæ of other cells. These fibrillæ have been variously called spines or prickles, and the name "prickle cell" has been given to the flat, polygonal cells containing these fibrillæ.

There are two types of epitheliomata, depending upon the type of cells that constitute them, which differ enough in their clinical appearance as well as in their histologic structure to be worthy of separate description. The essential pathologic process in both these types of epitheliomata, however, is a down-growing of the epiderm, with a proliferation of the cells of the stratum mucosum.

The *squamous cell* or *prickle cell* type of epitheliomata is made up of cells which correspond to the flat, polygonal, fibrillated, prickle cells of the stratum mucosum. In its earliest manifestations it is a

small, pearly thickening of the skin, covered with a scale. This scale, when at first picked off, leaves a moist surface, but soon the removal of the scale causes bleeding. Its course is then various. It may become elevated above the surrounding skin; it may spread peripherally without much elevation, giving the appearance of a flat disk; or it may grow into the subcutaneous tissue, making a small, irregularly-shaped tumor. In any case, ulceration soon starts, making an ulcer with a dark-red floor, from which spring minute epithelial projections. The margins are hard, indurated, and elevated. There is a slight mucosanguineous discharge. Except where ulceration extends deeply from the beginning, lymphatic involvement is not, as a rule, very early, but in this variety of epithelioma metastasis to the lymph-nodes takes place sooner or later. It is therefore more malignant than the type of epithelioma about to be described.

The *rodent ulcer* or *basal cell* type of epithelioma is composed chiefly of columnar epithelium (the inner cells of the mass being frequently oval), which correspond to the cells of the basal portion of the stratum mucosum. However, the lining cells of the hair-follicles, sweat and sebaceous glands may be a possible origin for this type of epitheliomata. The rodent ulcer first appears as a small, hard, faintly yellow or brown tubercle, with dilated blood-vessels running over its surface. It may remain so for years, but eventually ulceration starts. The ulcer is covered with a crust, which loosens and falls off, another crust forming. With the falling off of each subsequent crust the ulcer becomes larger. The process here appears to be more one of ulceration than one of new growth. The ulceration is peripheral as well as downward, and the margins do not show the same elevation and infiltration as is seen in the squamous cell epithelioma. The discharge is of a bloody character. After a time the ulceration spreads deeply, involving the subcutaneous tissue and even the bone. The lymphatics are rarely involved in rodent ulcer, and metastasis to the lymph-nodes (unless very late in the course of the disease) is a rarity.

In the diagnosis epithelioma must be differentiated from tubercular syphilid, lupus vulgaris, tuberculosis verrucosa cutis, and verruca. The following table brings out the salient points in their differentiation:

Epithelioma	Tubercular syphilid	Lupus vulgaris	Tuberculosis verrucosa cutis	Verruca
History of preexisting lesion, such as mole, wart, seborrhoeic keratotic patch.	Absent.	Absent.	Absent.	Absent.
Develops usually after fourth year; occasionally seen earlier.	Develops usually in middle life.	Develops usually about puberty or early adolescence.	Develops usually about puberty or early adolescence.	May develop at any age.
Single nodule or ulceration.	Multiple, grouped nodules which soften and necrose.	Multiple nodules which undergo necrosis.	Lesions multiple, coalesce, violaceous color, no tendency to distinct ulceration.	Lesions multiple, unusually discrete, grayish, or yellowish.
Nodule hard, the base stony hard.	Nodule firm, but not stony hard.	Nodule soft, of "apple jelly" transparency.	Lesions firm, but not hard.	Lesion firm, but not hard.
Ulceration has well-defined margin, which is raised, hard, indurated, and pearly in appearance. No tendency to heal.	Ulceration not well-defined. Margins are serpiginous, not indurated. Tendency not to heal, leaving a soft, sound, parchment-like scar.	Ulceration superficial. Border irregular, undetermined, not hard or indurated. Tendency to heal, leaving yellowish, shrunken, leathery scar.	No tendency to distinct ulceration, but lesions spread peripherally, leaving scar tissue.	No ulceration.
Great tendency to bleed if ribbed or squeezed or if crust is removed.	Does not bleed.	Does not bleed.	Does not bleed.	Does not bleed.
Discharge scanty and serousanguinous; later becoming more viscid.	Discharge profuse and purulent.	Discharge scanty and serousanguinous.	No discharge.	Progress slow.
Progress slow.	Progress rapid.	Progress slow.	Progress slow.	Progress slow.

In the treatment of epitheliomata the remedies recommended are many. Caustic pastes, X-ray, radium, desiccation, and radical excision all have their staunch supporters. Each one of them possesses certain features which give it a place in our therapeutic armamentarium, but certain disadvantages associated with each one are sufficient to prevent it from becoming a routine procedure. Caustic pastes I shall mention only to condemn; they are very unreliable, and I have seen several cases of small, slowly-growing epitheliomata converted into rapidly-growing ones by the stimulating action of some of these pastes. The actions of X-ray and of radium are practically identical, and in the hands of the experienced operator good results are obtained; but comparatively few of us are equipped with X-ray, and still fewer are the fortunate possessors of radium. They both have the disadvantage of being expensive, and are practicable only in the hands of the dermatologist who is trained in therapeutic X-ray as well. Fig. 1 shows the result of the usual X-ray treatment after six months of raying. Desiccation, too, is applicable only in the hands of the specialist. Radical excision is a major operation, and the fear of such a procedure, as well as the operative risk, however slight it may be, militates against the patient's accepting treatment at the earliest possible time.

It seems to me that a procedure for general use should be one in which the factors of expense, adaptability to the general practitioner, minimum operative risk to the patient, rapidity of results, as well as the final result, ought to swing the balance in favor of or against it. With this idea in mind I have been using the Sherwell operation, and from my experience with it am satisfied that it is the method of choice, since it fulfils all the foregoing requirements. Where there is no glandular involvement this operation can be done under local anaesthesia. Where the lesion is very extensive, or the patient insists upon a general anaesthetic, the patient need not be under the anaesthetic more than ten minutes. Of course, where glandular resection is necessary a general anaesthetic must be used, and the operative risk here resolves itself practically into that of the resection operation rather than that of the removal of the epithelioma.

Up until January 1, 1914, I had done this operation fourteen times. Of these fourteen cases, two I have been unable to locate since, two have had recurrences, and the remaining ten have solid white scars

FIG. 1.



Squamous-cell epithelioma, grew from size of five-cent piece to size of silver dollar during six months' course of X-ray treatment.

FIG. 2.



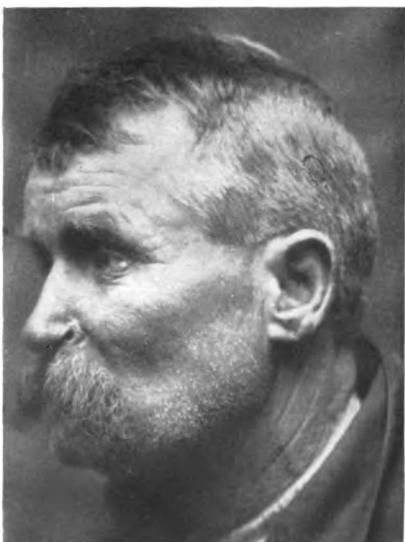
Same patient as Fig. 1, two years and eight months after operation.

FIG. 3.



Rodent ulcer of side of nose.

FIG. 4.



Same patient as Fig. 3, one year after operation.

FIG. 5.



FIG. 6.

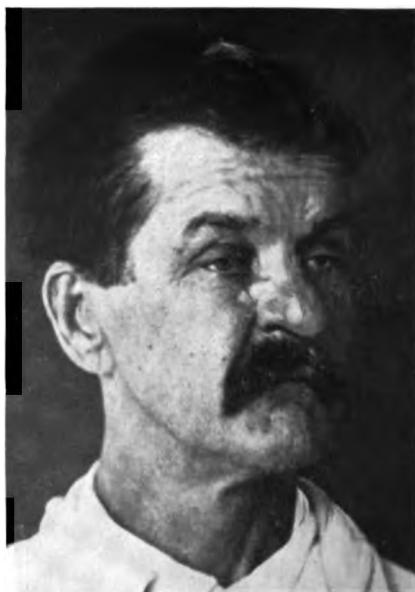


Epitheliomatous degeneration in senile keratotic patch on nose. Same patient as Fig. 5, ten months after operation.

FIG. 7.



FIG. 8.



Scar remaining after removal of rodent ulcer of lower lip. Three and one-half years post-operative.

Scar remaining after removal of rodent ulcer of side of nose and cheek. One year post-operative.

with no apparent tendency to recur. Of the two recurrences, both have died, one with middle-ear and mastoid involvement, the other with cervical gland metastasis. Both, however, were late cases.

The technic of the procedure is simple and as follows: If local anaesthesia is used the skin immediately around the margin of the lesion is infiltrated with a 2 per cent. solution of cocaine; then the base is infiltrated by inserting the needle at the margin and pushing underneath the lesion. A little of the cocaine solution can then be injected directly into the base of the lesion. Only the first puncture need be felt, as each succeeding puncture can be made in an already anaesthetized area.

With a medium-sized bone curette the epitheliomatous mass is quickly and thoroughly curetted away. Scraping should be continued until no more hard or infiltrated tissue can be felt; then with a small-sized curette the edges should be scraped. The bleeding, which will be free, must now be controlled and the wound made dry. This is accomplished by applying gauze sponges soaked in a 1 to 2000 adrenalin solution, to which some 2 per cent. cocaine solution may be added. The oozing will thus be controlled, and the bleeding points can then be touched with the actual cautery. When the wound is thoroughly dried the entire area as well as the margin is swabbed with the acid nitrate of mercury (U. S. P. 60 per cent.). The cauterant action is allowed to proceed for not more than ten minutes (if the lesion is on the eyelid, five minutes will suffice), at the end of which time it is neutralized by rubbing over the entire area most generously powdered bicarbonate of soda. A dry dressing is then applied, the patient removed to bed, and an appropriate dose of morphine by hypodermic administered.

If the lesion involves the eyelids, drop a few drops of cocaine solution into the eye, then cover the eyeball with a gauze pad soaked in a saturated solution of bicarbonate of soda. This will protect the eye from the acid nitrate of mercury. When the acid nitrate of mercury has been thoroughly neutralized, the gauze pad may be removed and a few drops of 20 per cent. argyrol instilled into the eye. If the eye shows any inflammatory reaction, the instillation of argyrol can be repeated three times daily until it subsides.

The after-treatment consists of keeping the area dry, using a mild antiseptic dusting powder if necessary. Within a few days the eschar

will begin to loosen about the margin, and as the epithelium grows in, it will separate itself and finally fall off. If the eschar falls off early, a healthy granulating surface will remain. Occasionally the granulations become exuberant, in which case they should be touched, from time to time, with a silver nitrate stick. The epithelium grows in at the rate of about one-eighth of an inch a week. If, for any reason, a small point remains which does not heal over, or which shows a tendency toward ulceration, it can be re-curetted and re-cauterized. The patient is usually up and about the following day, and in some of my cases the patient returned to his daily duties the third day after operation.¹

¹Bibliography, Allbutt and Rolleston System.

THE TREATMENT OF MALIGNANT TUMORS WITH ELECTRICAL METHODS *

BY DR. ARTHUR F. HOLDING

Electrologist to Cornell Cancer Research Laboratories, General Memorial Hospital,
New York City

In a recent article¹ I reported the results of 140 cases of malignant tumors treated by various methods with and without surgery. To recapitulate: I divided malignant tumors into three classes.

In malignant tumors of the first class it was shown that all cutting procedures were contra-indicated, as lesions of this superficial character could be cured by physical methods, without surgery, with less danger and better cosmetic results (Figs. 1, 2, and 3).

In malignant tumors of the second class it was advisable that a definite program of four steps should be carried out in all cases: (1) A massive dose of deep Röntgen rays delivered in one day. (2) Thorough radical operation on the following day. (3) Fulguration into the open wound immediately after the operation. (4) Post-operative deep röntgenotherapy or radium therapy to be instituted as soon after operation as the patient could be moved from her room to the Röntgen room (usually two or three days after the operation).

In malignant tumors of the third class, which comprise the main bulk of cases referred by X-ray or radium treatment, the cases were absolutely hopeless. These are the cases that are sure to die, and, naturally, the last agent used on such a case is discredited. The attempts to treat such cases account to some extent for the widespread discredit attached to the use of Röntgen rays for such maladies. Any improvement at all in these cases should be regarded as illustrating the inhibitory effect of radium and Röntgen rays, and if this action is obtained we should neither discredit ourselves by becoming too optimistic, nor allow ourselves to be discredited because of ultimate

* Read before the First District Branch.

¹ "The Treatment of Cancer by Electrical Methods," *New York Medical Journal*, Sept. 10, 1914.

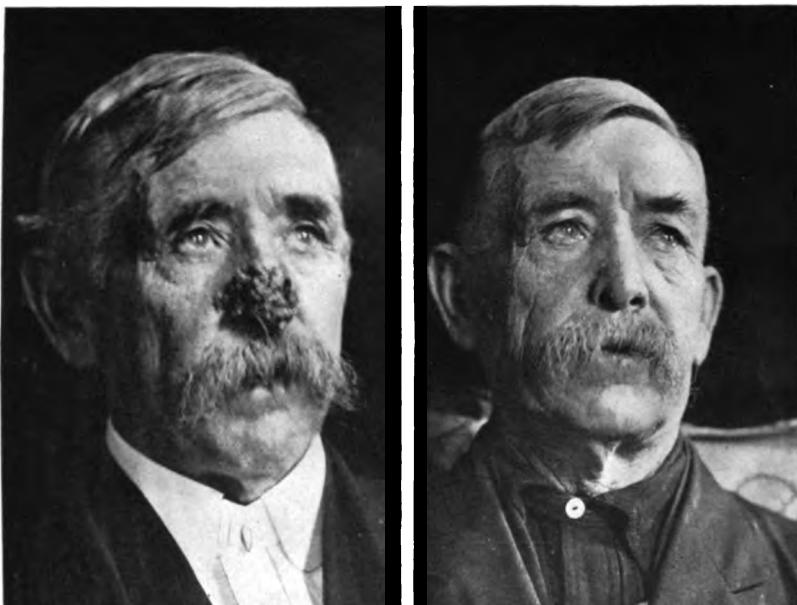
failure to cure, as the disease is so far advanced, when the patients present for treatment, that sufficient inhibition cannot be obtained to control the condition (Figs. 4, 5, and 6).

It is the purpose of this communication to describe some of the physical methods indicated and technic employed in treating this third class of patients, including the Coolidge tube and tintometer.

The Coolidge X-ray Tube.—The Coolidge tube is an X-ray tube the vacuum of which is about one hundred times more perfect than the vacuum of the ordinary X-ray tube. All the contained metal is tungsten or molybdenum. The penetration of this tube is controlled at will by means of a rheostat, which in turn controls the amount of heat that is generated in a tungsten wire filament incorporated in the cathode of the tube. The penetration of the tube is readily increased to two or three times that of the ordinary tube, so that it is not only possible to take röntgenographs of the densest parts of the human body, but also to make röntgenographs of plates of iron or steel, thereby enabling one to definitely show defects in the metal. The life of the tube is indefinitely long, barring accidents or breaks in the tungsten filament. To puncture it is almost impossible. A glass somewhat heavier and thicker than that usually found in the ordinary X-ray tube is used for its manufacture.

A new model of the Coolidge tube is being made which will back up a parallel spark gap of 15 inches, requiring an electric capacity of 150,000 volts to actuate it, and the rays are expected to rival the penetration of the most penetrating gamma rays of radium. With the new tube a much larger dose of deep penetrating X-rays can safely be administered than was possible with the old type of tube, and the six- to ten-minute period of time previously required to administer fifteen to twenty Kienböck units can be diminished to two to three minutes. The appearance of the Coolidge tube is totally unlike that of the ordinary tube, as no zone of fluorescence is visible, and the only way one can tell that the tube is generating X-rays is by watching the fluoroscopic screen, by observing that the internal metal parts become red-hot or incandescent, and by noting the registration on the milliampèremeter. With this tube backing up a parallel spark of 10 inches, passing 7 millampères through the tube at a focus skin distance of 6 inches through a filter of 3 millimetres of

FIG. 1.

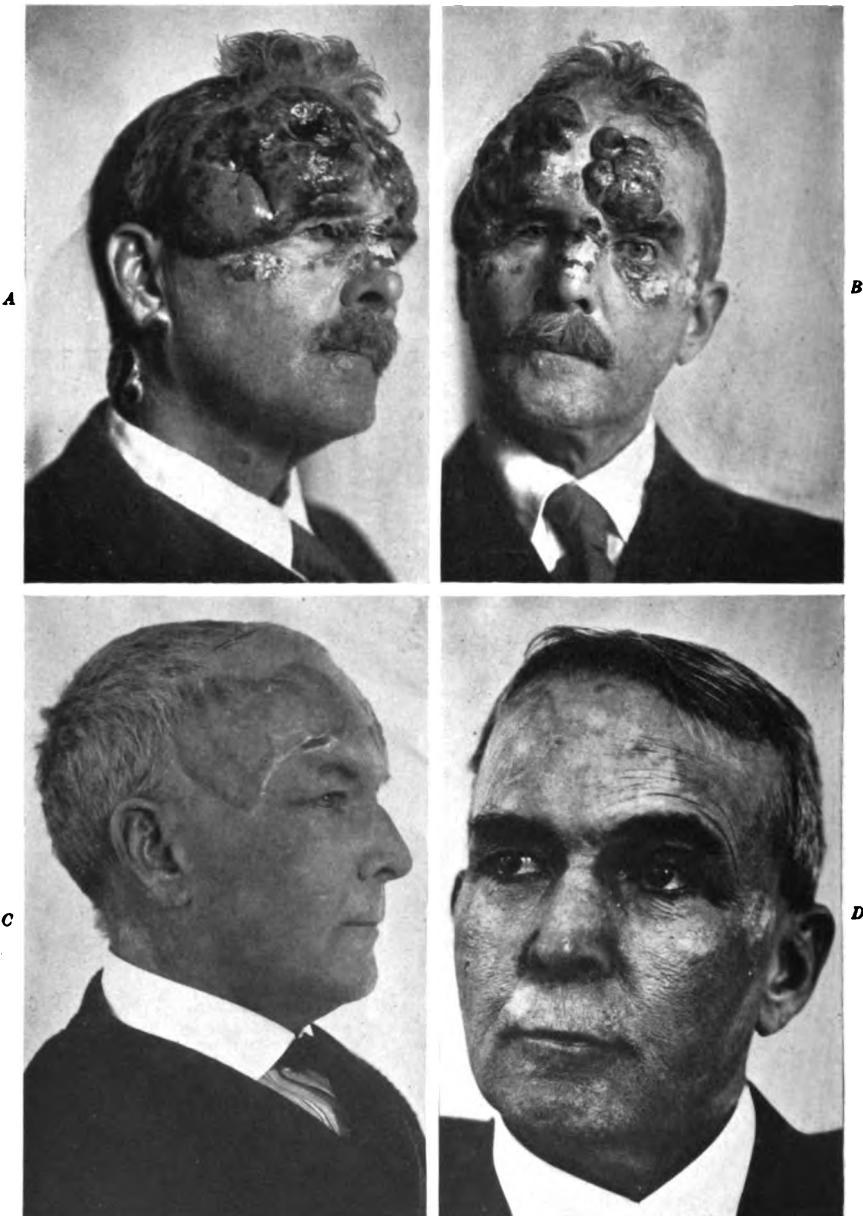


Before.

After.

Case of first-degree malignancy, cured by röntgenotherapy without cosmetic blemish. Cases of first-degree malignancy can be cured by either Röntgen rays or radium. Any cutting operation is contra-indicated. (Case treated by H. W. Dachtler, Toledo, Ohio.)

FIG. 2.



A and **B.** Mycosis fungoides—before. **C.** Surgical result. **D.** X-ray and radium result.

Case of first-degree malignancy. Mycosis fungoides. Diagnosis confirmed by microscopical examination. The right temporal region was treated by surgical procedure. The remaining lesions were treated by massive röntgenotherapy, radium, and desiccation. There was a prompt recurrence in the area desiccated. This case illustrates that in cases of the first-degree of malignancy cutting operations are contra-indicated, because non-cutting physical methods give better cosmetic results with less shock and risk.

FIG. 3.



Before.

Case of first-degree malignancy. The growth had been cut out, with resultant scar and deformity. Recurrence in the wound. The second illustration shows the recurrence completely controlled and the scar softened by massive röntgenotherapy. Had this latter method been employed instead of surgery in the first place the condition would have been controlled without the resultant scar.

After.

FIG. 4.



Before.

Case of third-degree malignancy. Lymphosarcoma. Diagnosis confirmed by microscopical section. Treated by various methods, including mixed toxins, without material improvement. Under massive, deep röntgenotherapy the following result was obtained. The patient subsequently died of an intercurrent disease.

After.

FIG. 5.

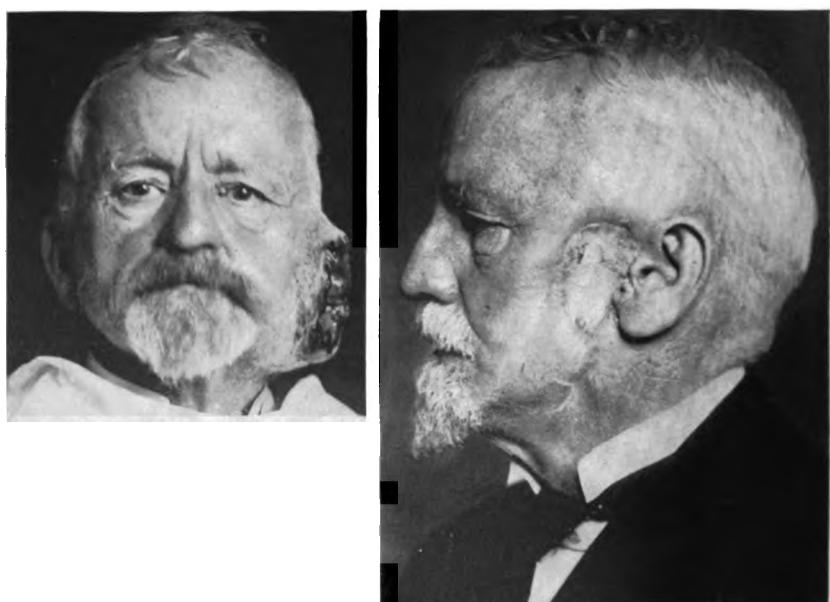


Before.

Case of third-degree malignancy. Sarcoma (infectious granuloma). Diagnosis based on microscopic section. Case failed to respond to mixed toxin treatment. Complete recovery to date under massive, deep röntgenotherapy.

After.

FIG. 6.



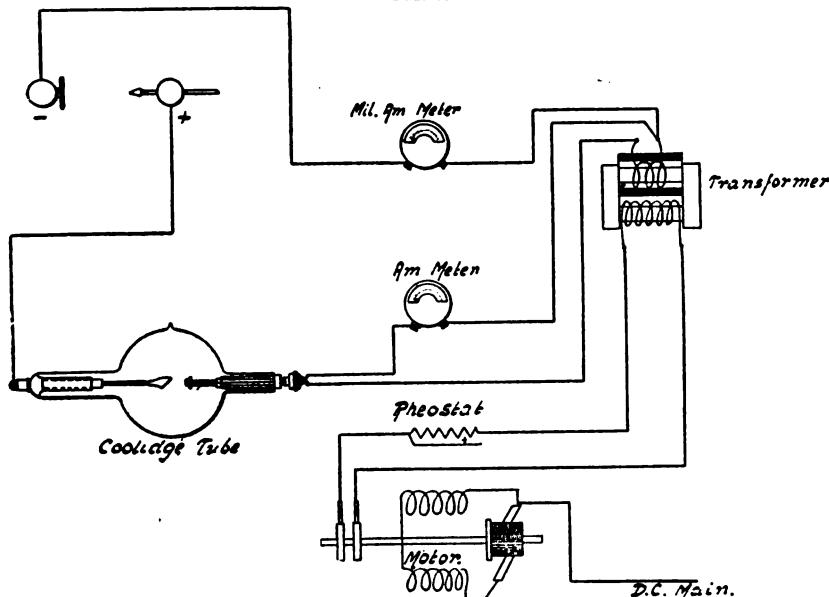
Before.

Case of third-degree malignancy. Epithelioma. Diagnosis confirmed by microscopical section. Case treated by operation, fulguration, postoperative deep röntgenotherapy and radium. Illustration shows the marked involvement which did not yield to any form of treatment, but penetrated to the brain. The patient died. Had he come for treatment before bone involvement developed, the end result would have been quite different.

aluminum, I deliver 40 Kienböck units—20 Holzknecht, 16 Hampson, 4B tint Sabouraud—in four minutes.

Instead of using the storage batteries to heat the filament of the Coolidge tube, as recommended by the makers of this tube, I have had a small heating unit transformer made to do this work. It obviates all the well-known disadvantages of keeping the storage batteries charged, requires practically no attention between treatments, and is always ready for use. The rheostat controlling the current is placed

FIG. 7.



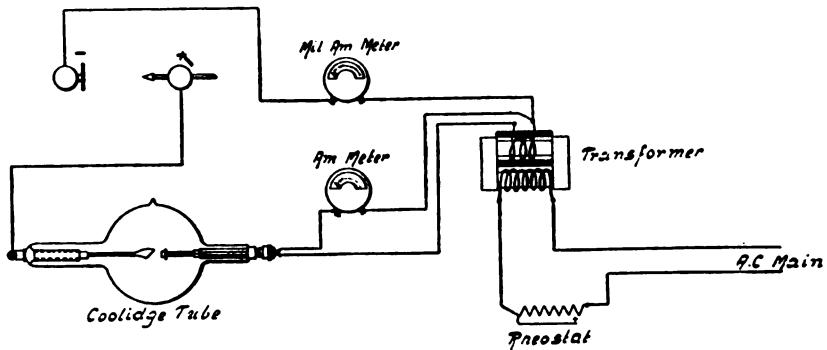
Diagrammatic drawing of heating unit transformer for Coolidge tube for direct current

on the switchboard of the X-ray machine, under the operator's hand, and is operated by a rack and pinion, allowing the finest adjustment with the greatest ease. It is advisable to have this heating unit transformer on a separate current supply line from that which supplies the X-ray generating transformer. For instance, in my laboratory the X-ray generating apparatus is run by a commercial 220-volt alternating current, while the heating unit transformer for the Coolidge tube is run on the 110-volt direct current generated in the hospital (Figs. 7 and 8).

Tintometer.—The tintometer is an apparatus which affords in-

creased accuracy in measuring X-ray dosage. Its excellence is based on the fact that the scale of colors used in measuring is scientifically determined and unchangeable; they will not fade nor soil with use, in which particular it excels the Holzknecht, Hampson, and Sabouraud radiochronometers. The colors exactly match those produced in the treatment pastilles, both in tint and grain, instead of approximating them as in the Hampson instrument. The reading field is totally black, except at the two ports, where the standard color and the pastilles are visible, in which respect it surpasses all other meters (Fig. 9). Thus the eye can concentrate on the comparison of these two tints without being distracted by the presence in the field of figures or letters. It surpasses the Kienböck instrument, as it avoids all of the fussing and delay of developing photographic strips under unvarying conditions.

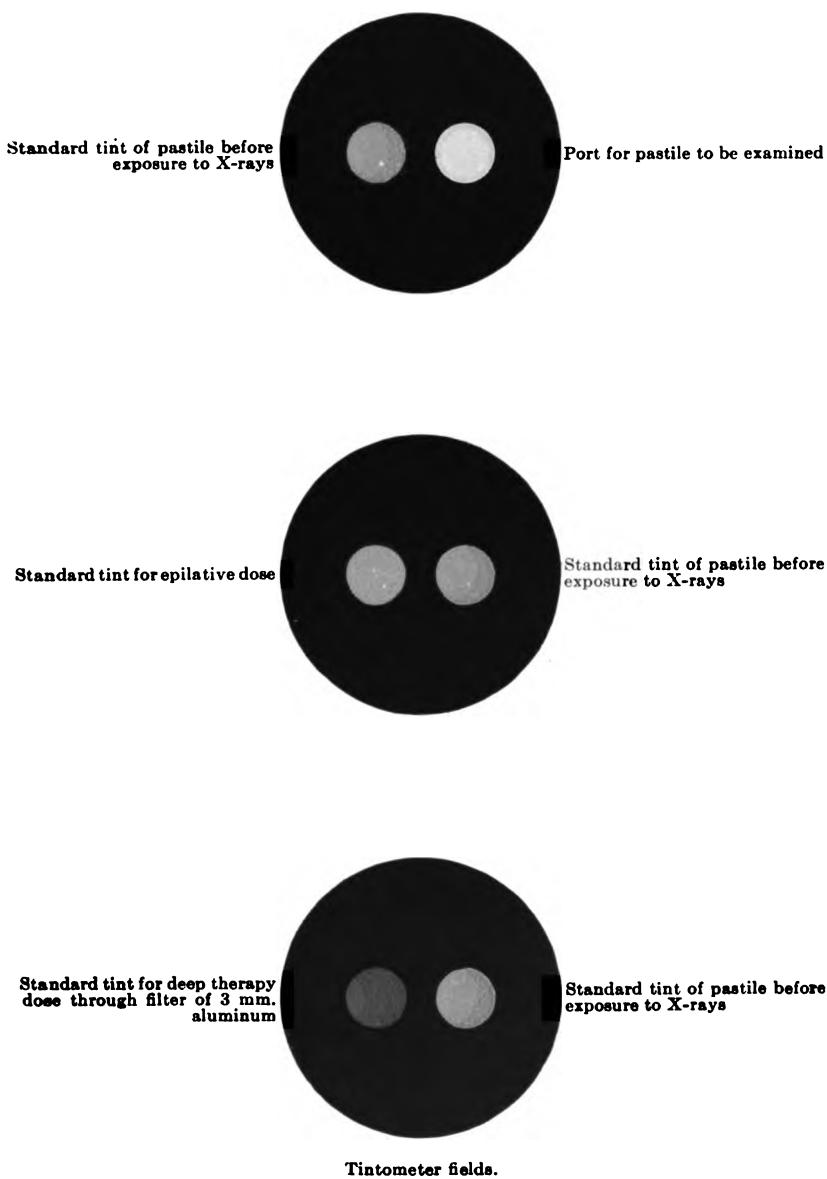
FIG. 8.



Diagrammatic drawing of heating unit transformer for Coolidge tube for alternating current.

Radium and Radium Emanations.—On account of the extravagant exploitations of radium as a therapeutic agent by the profession as well as by laymen, it is of interest to compare its relative value with that of other physical methods. The exploitation of radium has been fortunate in many respects. In the first place, it is so rare and expensive that it has been placed only in the hands of well-known physicians, surgeons, or scientists, who have felt in duty bound to test it extensively and report upon its properties. Their results are not nullified by a great multitude of mediocre or unreliable results promulgated by inexperienced observers who happened to have a few hundred dollars that they were willing to invest in the new agent, which agent they must needs exploit in order to get their money back,

Fig. 9.



as was the case when the X-ray machines were put on the market. Accordingly, results obtained with radium have been taken more seriously than the success of its predecessor in the radio-active field,—the X-rays. Electricity of any kind as a therapeutic agent is not taken very seriously by most of the profession, largely because of the unscientific character of the majority of men who have exploited electricity. It is singular that the radium workers, who are more scientific as a whole, seem to be unfamiliar with the therapeutic effects obtained by means of the X-rays in efficient workers' hands. Several of the best known radium workers have pointed with pride to their results in treating epitheliomata, the various leukæmias, Hodgkin's disease, and exophthalmic goitres, for instance, and appear surprised when informed that the same results were reported years ago by X-ray workers, and that successful treatment of these conditions is a routine occurrence in the practice of good röntgenotherapists. In personal conversation with some of the most noted radium workers in this country one notices that they look skeptical (even when they refrain from expressing skepticism) when assured that X-rays, properly administered, will control all the symptoms complained of in exophthalmic goitre except exophthalmos, and that the blood-counts and lymphatic enlargements in leukæmias and the lymphatic enlargements in pseudoleukæmias can all be controlled, at least temporarily. These results are established facts, attested by numerous authentic references in the medical literature. Whether the results obtained by radium will be more permanent than those obtained by the X-rays cannot be stated at the present time, as the radium cases are too recent to warrant any conclusion. There really should be little or no rivalry between these two methods, as the agents are both similar and can be used as tremendous assistants in the surgical relief of cancer. It is true that the more penetrating gamma rays of Radium C have not been equalled by Röntgen (except in the experimental laboratory of the General Electric Company, where attempts are now being carried out to do this), but, on the other hand, eminent authorities in physics question the utility of these intense, high-penetrating rays, claiming that they pass through, but do not affect tissues traversed.

Electric Cautery.—The electric cautery of Percy seems to have made some impression on the surgical mind, but the virtues of desiccation, diathermy, and fulguration are hardly known and seldom

practised by surgeons. It is to be hoped that the propaganda of radium, associated with the timely invention of the Coolidge tube, will call to the attention of the medical profession the value of electrical methods. This can hardly result in a large vogue for these methods unless they are championed by prominent surgeons.

Electrothermic Coagulation.—By electrothermic coagulation one utilizes the high-frequency current, concentrating the effect in malignant tissues so as to produce coagulation necrosis very rapidly, seal all blood-vessels, and prevent hemorrhage, as well as all danger of liberating malignant cells in an open wound. There are no deleterious polar effects, and the apparatus used is much more simple and durable than any form of cautery. A line of demarcation about the zone of coagulation necrosis can be determined at will; and the inflammatory area walling off the slough is an additional barrier against recurrence or extension of the disease. A very light anaesthesia is required for these electrothermic coagulation operations; the shock is slight, the postoperative pain is *nil*, and a few hours after operation the patient is in condition to walk home. The use of this method is valuable where surgical removal is indicated, where good cosmetic results are desirable, and where there is considerable danger from hemorrhage. This method should not be used in the vicinity of important structures where a careful dissection is necessary. Figs. 10, 11, and 12 illustrate the localization of cauterization or coagulation effects of the high-frequency currents in an albuminous fluid, according to the size of the electrodes used. Observe that this is not coagulation by convective heat from a metal cautery applied externally, subject to the heat loss of carbonization, but a coagulation within the body. Electric currents readily pass through tissues without causing a wound. Convective cauteries cannot do this.

In comparing the relative value of the various physical methods, six points may well be considered.

Cost.—Radium is far more expensive than any of the other methods. Massive X-rays, electric desiccation, and ultraviolet rays come next in expense. Surgery and caustics are the cheapest.

Ease of Application.—As to ease of application, much depends upon the training of the individual who administers the treatment. Each therapist will naturally do the best work with the greatest

FIG. 10.

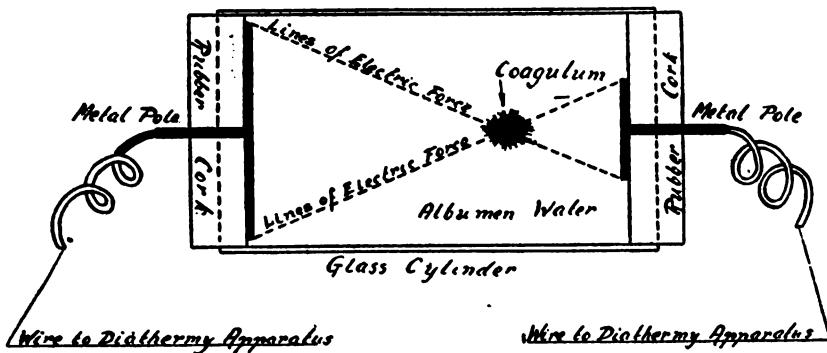


FIG. 11.

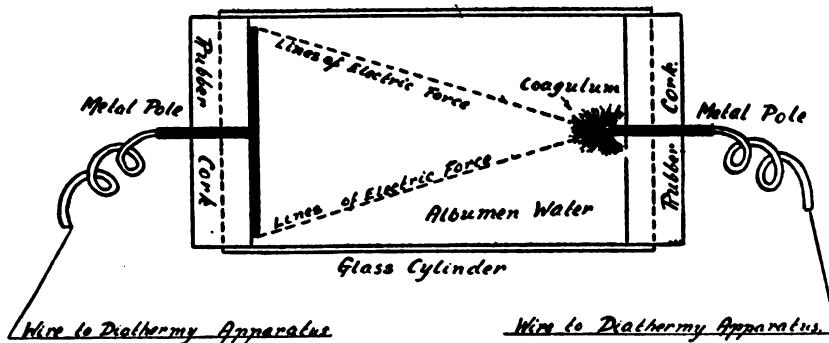
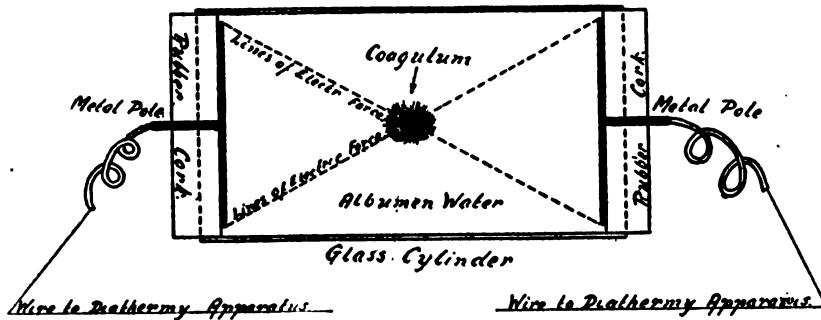


FIG. 12.



Localization of cauterisation or coagulation effects of the high-frequency currents in an albuminous fluid according to the size of the electrode used. (Largest electrode in Fig. 10; smallest in Fig. 12.)

ease by employing the agent with which he is most familiar. Other things being equal, radium and caustics are easier to apply than the other agents in question.

Time Consumed in Treatment.—Radium applications are much longer in duration than any of the other methods. They require hours, while the other treatments require minutes.

Pain.—Radium, X-ray, and ultraviolet light treatments cause no pain. Electric desiccation and carbon dioxide snow cause slight pain. Surgery and cauterization are very painful and require a local anesthetic. Chemical caustics are the most painful.

Cosmetic Effects.—Cosmetic effects are best after radium, X-rays, ultraviolet light, desiccation, and carbon dioxide snow, and poorest after surgery or cautery.

Dangers.—With a proper technic there are no dangers in any of these methods. Poor technic is a *de facto* contra-indication for the use of any agent, for it will need the combined energies of the advocates of both forms of radio-activity to persuade the surgeons of to-day to admit that there is efficacy in either method.

The only hope for the relief of internal growths is to diagnose them in their incipiency. By the proper use of the Röntgen rays, a positive or negative diagnosis of carcinoma or ulcer of the gastrointestinal tract can be made in the earliest stages of the involvement. Furthermore, its size, shape, and position can be determined, painlessly and without shock or danger. This accurate information affords an opportunity for the early and successful removal by surgical operation of the cancer or ulcer-bearing area, moreover reducing the time required for surgical examination and operation and consequently the amount of shock entailed, so that the percentage of recoveries after surgical removal is increased.

The problem of handling malignancy to-day resolves itself, therefore, into:

1. The proper treatment of external cases of malignant tumors of the first degree, lest they develop into cases of malignant tumors of the second and third degrees.

2. Increasing the palliative effects possible for external malignant tumors of the second and third degrees, so that they may be regarded as actually remedial.

3. The diagnosis and early surgical removal of ulcer-bearing areas and malignant conditions of the gastro-intestinal tract in their incipiency.

CONCLUSIONS

1. Incipient surface cancers can be cured: (*a*) if *superficial*, by physical methods; (*b*) if *deep*, by physical methods and surgery.
2. The physical methods employed include massive X-ray doses, desiccation (Clark), fulguration (De Keating Hartt), diathermy (Nagelschmidt), and radium.
3. Beginning cancer of the gastro-intestinal tract can be diagnosed with accuracy by recently improved X-ray methods.
4. Advanced cancer, either internal or external, cannot be cured.

Medicine

A REPORT OF TWO VISITS TO THE MEDICAL CLINIC OF PROF. THOMAS McCRAE AT THE JEFFERSON MEDICAL COLLEGE HOSPITAL IN OCTOBER, 1914

BY E. J. G. BEARDSLEY, M.D.

Philadelphia

Dr. Thomas McCrae, born at Guelph, Ontario, 1870; A.B., University of Toronto, 1891; M.B., University of Toronto, 1895; M.D., University of Toronto, 1903; M.R.C.P. (London), 1901; F.R.C.P. (London), 1907.

PROFESSOR McCRAE was formerly associate professor of medicine and clinical therapeutics at the Johns Hopkins Medical School. He is now professor of medicine at the Jefferson Medical College and is attending physician to the Jefferson and Pennsylvania Hospitals. A visitor to the clinic of Dr. Thomas McCrae is at once impressed that he is in the presence of a successful and popular teacher. The amphitheatre benches are well filled with senior and junior students before the clinic hour arrives, and there are few late comers. The entrance to the arena is occupied by a number of visiting physicians and by assistants and house officers from the medical as well as from other departments of the hospital. Better attention could scarcely be given a lecturer, and the reporter noted no restlessness among the students, nor were there any departures, even from the upper rows of the benches, until the classes were dismissed.

That over three hundred undergraduate students should attend a medical clinic on a sultry Indian summer afternoon, in a building none too well ventilated, indicates that they fully realize and appreciate the value of practical clinical instruction by a clinician who well deserves the honorable title of teacher.

The reason for Dr. McCrae's deserved popularity as a teacher and clinician is well understood after a visit to his clinic. He has a pleasing personality, an attractive manner, and is a forceful, authoritative speaker, without appearing in the least dogmatic. That he enjoys

teaching no one will doubt who has seen him preside at a clinic or ward class. His attitude toward his students reveals not only a real friendliness for them, but a very real interest in their progress. He treats each student with the kindly consideration due a younger and less experienced colleague, and there is in his manner an entire absence of inferred superiority upon his part. It seems a noteworthy feature of this great teaching clinic that no self-aggrandizement is countenanced. It is evident that Dr. McCrae is much too busy inculcating the principles of diagnosis and treatment to devote his time at the clinic to the advertisement of his own skill or knowledge.

A visitor cannot but be impressed with the thought that it is a great advantage for any medical school to have the head of such a department as medicine devoting half his time to supervising the work of the department and teaching. Just what this means to the student body of such an institution is best understood by those medical men who were students during the days when justly popular and busy clinicians gave what time they felt they could afford from their private work to deliver lectures and give clinics, and left the important work of practical instruction to assistants.

With the head of the department giving half his time to research, supervision, and teaching, a notable change has occurred in the teaching methods employed. The younger teachers follow with enthusiasm a leader whose ambition is to make the medical course more systematic, more practical, and more interesting.

Dr. McCrae's attitude toward his associates in the medical department could not but increase their loyalty toward him. The apparent pleasure with which he advances the interests of his associates is refreshing to witness. If one of his assistants is interested in a particular line of work, not only does Dr. McCrae take personal interest in the work, but he makes it possible that the assistant be given an opportunity at the clinic or lecture of presenting a *résumé* of the work and its results before the various classes. His associates are assigned important series of courses of instruction, and are made to feel that their work for the college is as important and as much appreciated as is his own work. Conferences as to methods of work in which each associate is given the opportunity of expressing his views are held at intervals. In the practical work in the wards each teacher holding a ward class is requested to point out any deficiencies of the various

students, so that these men may be warned as to their low grades in time to correct their methods of work early in the year. It is evident that Dr. McCrae believes thoroughly in team work in the education of medical students, and his efforts are constantly employed in building up a more efficient teaching organization.

Another feature of this teaching clinic that attracts immediate and favorable attention is the consideration shown and the thoughtfulness exercised in dealing with the patients. Not only is their physical comfort safeguarded, but their mental comfort is provided for as well. So often in teaching clinics the consent of the ward patient to being shown at the clinic is taken for granted or is demanded, while at the Jefferson Hospital the patients' wishes are considered, and the matter of appearing at the public clinic or being made use of in the ward class teaching is discussed with and decided by them.

Every consideration is shown the patient, and the thoughtfulness of the head of the department in this regard is reflected in the attitude of the internes, nurses, students, and orderlies. Apparently the one happening that can disturb the equanimity of Dr. McCrae is to have any member of his corps of teachers, internes, nurses, students, or orderlies neglectful of the comfort of the patients under his care. It was noted with interest that this consideration for the sensibilities of the patients was further illustrated by the absence of all references to "cases." Each patient had, and was addressed by, his or her name. Usually it was the first name that was used, and in a very friendly, kindly way. No private patient could have been shown greater courtesy or have been treated with more kindness than were these ward patients.

One excellent reason for Dr. McCrae's success as a teacher is his precept and example regarding the absolute importance of system and routine in diagnosis. He evidently does not encourage the so-called brilliancy in diagnosis which so often leads to humiliating mistakes. The blackboard and crayon are in constant evidence and are in frequent use throughout the clinic. All the essential features of the symptomatology, the diagnosis, and the treatment are placed upon the blackboard and are easily transferred to the note-books.

There was no attempt at eloquence, unless it was the true eloquence of plain speaking, in discussing the symptoms, the diagnosis, and the treatment. There were no references concerning patients seen in

private practice or in consultation, but frequent attention was called to certain features of disease as illustrated in patients who had been shown at recent clinics or had been studied in the wards by the students.

The first patient shown was a young Irishman, a miner by occupation, aged 29 years, whose chief complaint was "shortness of breath and cough." His family history proved unimportant. His past medical history was that he had an attack of measles and pneumonia as a child, but had never had rheumatic fever, typhoid fever, scarlet fever, or diphtheria. He suffered from an "abscess in his throat" in 1902 and an attack of pleurisy a few months later. He denied venereal infection. He has never had a severe injury. He drinks alcohol freely (ten drinks daily average), whiskey preferably, but on occasions beer. He smokes moderately (?), but does not chew tobacco.

The patient's present illness began three years ago, while working in a coal mine. His first symptom was dyspnoea on exertion, which seems to have been insidious in onset. The dyspnoea soon became very severe, and another symptom was added to it, namely, cough. At this time and for months past he has had a considerable expectoration of black and yellowish sputum. In February of the present year (eight months ago) the patient had a profuse hemorrhage from the lungs. He feels sure that this blood came from his lungs, as it came during an attack of coughing and was bright red. About this time he noticed a violent overaction of the heart. So violent was its action that those standing near the patient would notice the forcible beating. The patient was greatly distressed by "indigestion," and his appetite became impaired. He often vomited and was disturbed by dyspnoea at night. His weight has been much reduced in the past three years. He recalls that four years ago he weighed 184 pounds, but now he weighs but 136, a loss of 48 pounds.

After the history was read attention was called to the important points in it. For example, attention was directed to the mistake of depending upon the average patient's statements regarding past illnesses unless a careful inquiry seemed to confirm the history. Dr. McCrae pointed out how necessary it was to ascertain how long an attack of "pneumonia" lasted, and its symptoms, before accepting such a history. He advised a careful inquiry into the history of

supposed attacks of rheumatism to ascertain if red, swollen joints were really present or if it were not some other disease or condition in which pain was a symptom. It was pointed out that nearly all physicians are prone to accept such diagnoses as made by the patient or by the patient's friends, and special attention was called to the carelessness of accepting a diagnosis of "piles" or hemorrhoids without a careful examination. Dr. McCrae pointed out how necessary frequent examinations of normal conditions are in order that one may recognize abnormal states when they are met with. That it was much better to make many examinations that revealed only normal conditions than it was to overlook an abnormal condition through having neglected to make the necessary examination.

After reviewing the patient's history, Dr. McCrae asked one of the students what diagnosis might be suggested by the history. The answer was "pulmonary tuberculosis," and the grounds given for this opinion were placed upon the blackboard, as follows: (1) Pulmonary hemorrhage. (2) Dyspnea. (3) Gradual loss of weight. (4) The emaciated appearance of the patient. (5) The patient's occupation.

Another student suggested that dyspnea was an unusual symptom of early tuberculosis, and that the diagnosis was quite as likely to be bronchiectasis, complicated by emphysema. Still another student expressed himself as of the opinion that organic disease of the heart could readily account for all the symptoms enumerated by the patient.

The susceptibility of coal miners to tuberculous infection was discussed, and it was decided that the hygiene of the miners' homes was quite as important a factor in the production of tuberculous infections as their occupation. One of the students was requested to look up the literature and report the latest and most complete reports of the incidence of tuberculous infection among coal miners. (The college has a well-equipped library, with some six thousand volumes of the more important text-books and works of reference, as well as the leading medical periodicals. A trained librarian is in charge to aid the students in their investigations, and the rules of the library allow the books to be removed to the students' rooms under certain restrictions.) The question was then asked as to how the diagnosis of pulmonary tuberculosis could be confirmed or refuted.

One of the students answered this question, and his reply was placed upon the blackboard. (1) By repeated sputum examinations.

(The examinations thus far had proved negative for tubercle bacilli.)
(2) By careful physical examination of the lungs. (3). By a study of the temperature, pulse, and respiration chart. (4) By the result of the tuberculin test.

Another student suggested that a physical examination of the heart might reveal a heart condition that would satisfactorily account for all the patient's symptoms. Dr. McCrae pointed out that the patient should be comfortably placed with bared chest before such an examination should be attempted. The necessity of careful inspection beginning with the face, hair, eyes, noting the sclera as well as the pupillary reaction, the ears for gouty tophi, the vessels of the neck, the thyroid gland, the precordium, the position of the apex beat of the heart, the rhythm of the heart action and its strength, was impressed upon the students. The value of palpation was then referred to, and the necessity of palpating the entire cardiac area for abnormal pulsations, thrills, or shocks.

Dr. McCrae then examined the patient as he had indicated, pointing out the pulsating vessels of the neck and slight cyanosis of the lips. On palpation of the area near the cardiac apex a presystolic thrill was found, while over the body of the heart a systolic shock was felt. The apex beat was displaced to the left. Percussion revealed that the area of cardiac dulness was increased both to the right and left. The necessity of constant practice of percussion was referred to, and that it was essential that this method of examination must be used as a routine measure in both normal and abnormal conditions if one's findings are to be depended upon.

On auscultation marked irregularity of the heart action was discovered, and the presence of murmurs near the apex. One murmur occurred during systole and was transmitted to the axilla, and there was also present a rough presystolic murmur which was not transmitted. Dr. McCrae spoke of the difficulty that sometimes arises in timing heart murmurs in the mitral area, and stated that when there was irregularity of the heart action associated with the presence in the apex region of murmurs difficult to time it was safe, as a rule, and in the absence of signs of aortic insufficiency, to decide that one was dealing with a double mitral lesion. When mitral insufficiency exists alone the murmur is usually well defined and easily timed, while the heart's action is likely to be fairly regular. If was

pointed out that the presence of a thrill occurring slightly before the apex beat, especially in an irregular heart, indicated an obstruction at the mitral orifice, and that this lesion was, in the greater number of instances, associated with more or less mitral regurgitation. At the base of the patient's heart no murmurs were heard, but the pulmonic sound was much accentuated, and below the fourth rib the mitral murmurs could be distinctly heard. An examination of the chest revealed a characteristic emphysematous appearance. Palpation showed diminished vocal fremitus. On percussion the chest was found hyperresonant throughout. Auscultation revealed the presence of numerous sibilant and sonorous râles throughout each lung.

Dr. McCrae then stated the probable diagnosis as follows: Chronic mitral endocarditis with failing compensation; pulmonary hemorrhage secondary to the mitral lesion; emphysema with complicating bronchitis; beginning arteriosclerosis.

Regarding the treatment, it was clearly pointed out that the conditions from which the patient suffered were unalterable, so far as cure was concerned, but that much could be done to render the patient comfortable and to prolong his life. The patient must be taught to avoid exposure to sudden changes of temperature to prevent the extension of the bronchitis already present. The treatment, other than hygienic and climatic, is symptomatic, and the students were properly warned as to the evils of unnecessary drugging.

The second patient was a young Hebrew woman of 19, whose chief complaint was "weakness and nervousness." The family history was unimportant. The patient stated that she had measles in early life, but had never suffered from any other acute illness. During her childhood she had many attacks of "sore throat."

In 1911 the patient noticed that she could not control her urine during her sleep. She had never had difficulty in this way previously. The symptom occurred but infrequently at first, but later became troublesome and has continued for three years. In 1911 the patient began to increase in weight. She did not know just how much weight she gained, but thought it was a considerable amount.

The patient stated that she had "always been nervous," and this symptom had been more marked of late. She had noticed that she trembled a good deal when any cause of excitement occurred. Two years ago she noticed a "swelling in her neck," and this had grown

to be very noticeable, being especially prominent during her "nervous spells." For almost two years her family and friends had noticed that her eyes were a little more prominent than formerly. She suffered with attacks of palpitation of the heart, was troubled with excessive perspiration, and often had blotches upon her skin, which appeared and disappeared without apparent cause.

The physical signs and symptoms that were prominent factors in this young woman's illness were: (1) Goitre. (2) Exophthalmus. (3) Tremor. (4) Rapid heart action. (5) Nervous and mental symptoms. (6) Sweating and skin eruption (erythema).

Dr. McCrae called attention to the fact that in addition to the symptoms and signs of hyperthyroidism this patient presented certain symptoms which may be associated with disturbances of function of the pituitary gland. She had gained weight, an unusual symptom in uncomplicated hyperthyroidism, and she had aneurosis, which symptom is associated with both pituitary disease as well as affections of the thyroid gland.

The prominent symptoms of hyperthyroidism were then enumerated and placed upon the blackboard, as follows: (1) The nervous and mental symptoms. (These are the most constant and important findings in the partially developed case.) (2) The overacting heart. (3) The tremor. (4) The goitre. (5) The exophthalmus and associated eye signs. (6) The digestive disturbances (vomiting, diarrhea, loss of weight and strength). (7) The skin changes (hyperhidrosis, pruritus, skin eruptions, and pigmentation).

Dr. McCrae stated that there was little excuse for a physician mistaking a fully-developed case of hyperthyroidism for any other condition, but explained that the difficulty in diagnosis lay in the incompleteness of the early symptoms, which are often misinterpreted. He warned the students to study carefully all the nervous patients that consult them, particularly the women, because of the possibility that the nervous and mental symptoms might be due to altered or overabundant secretion of the thyroid gland. Particular care should be used when, in addition to nervous symptoms, there are also signs of cardiac disturbance. The way to avoid mistakes in this class of cases is to use great care in the taking of the patient's past medical history, and equal care in a systematic and thorough examination of the patient.

The students were cautioned to remember that, although the usual form of hyperthyroidism was chronic in its nature, occasionally an acute toxic case occurred that was likely to prove puzzling. Usually such cases show marked gastro-intestinal disorders, such as nausea and vomiting, often associated with a troublesome diarrhoea. The nervous symptoms may be masked by the gastric symptoms, and the best chance of avoiding errors consists, as it does in other puzzling cases, in a complete routine examination of the patient.

The variability of the heart action was referred to, and it was stated that seldom was the pulse found to be less than 90 to the minute, while a more common finding was a rate of from 120 to 140. The importance of remembering that a fair percentage of cases of hyperthyroidism would show the absence of one or more of the so-called classical signs was insisted upon. The goitre and the exophthalmus are the two signs more frequently absent.

Von Graefe's sign was mentioned as the lagging of the eyelid when the eyeball is moved downward; Stellwag's sign as the widening of the palpebral fissure; and Möbius's sign as an inability to properly converge the eye. Enlargement of the thyroid gland is the rule, but one must remember that the enlargement of the gland may be intra-thoracic, or that a scarcely palpable gland may give the most toxic symptoms.

Occasionally one meets with a case in which the chief symptom is an anaemia with slight fever. Most patients with hyperthyroidism have slight fever at intervals, but the temperature may be for long periods subnormal. Dr. McCrae referred to the fact that it had been noted that it is not uncommon to have more than one gland of the body perverted in its action. He mentioned that it was well to bear in mind the possibility of the thymus, the pancreas, the pituitary, the adrenals, and the ovaries being involved at the same time that the thyroid revealed altered secretion. Treatment was briefly touched upon. The need of physical and mental rest was brought out, and the advantage of having the patient out of doors if possible. An easily-digested diet is important. Little medicine should be given except for urgent symptoms. In patients such as the young woman in question a thorough course of medical treatment should be insisted upon before other measures were advanced. The question of using glandular therapy cautiously was discussed. In this patient the administra-

tion of thymus extract had apparently been of benefit. X-ray treatment was mentioned as beneficial in relieving symptoms, and surgical measures were advised for those patients who did not do well with a fair trial of medical measures.

Two patients were shown at the second clinic that the recorder attended. The first patient was a white man, aged 45 years, a leather worker, whose chief complaint was pain and distress in the region of his stomach, nausea, vomiting, and loss of weight. The patient's family history was negative and the past medical history unimportant until the beginning of the present illness. He had not had lues or tripper, and had never been seriously ill. He had used alcohol and tobacco freely. For four years this man had had "stomach trouble." He had had gastric distress and vomited frequently. Dr. McCrae called attention to the patient, who was emaciated, had a particularly sallow appearance, and was markedly anaemic. The result of the blood examination was placed upon the blackboard: Haemoglobin, 17 per cent.; erythrocytes, 1,370,000; leucocytes, 7800.

Attention was directed to the marked character of the secondary anaemia. It was noted that the patient's face seemed far more emaciated than did his body. The heart and lungs were carefully examined and were found normal. On inspection of the abdomen it could be seen at once that there was a distinct bulging of the epigastrium, especially on the left side, and that the bulging mass showed a marked pulsation. Dr. McCrae then asked Dr. B. B. Vincent Lyon, one of his associates, who is particularly interested in gastro-intestinal work, to tell something of the progress of the case. Dr. Lyon stated that he first saw the patient in July, 1913, when the only note of past illness that could be elicited was an indefinite history of arthritis and a marked history of alcoholism. The patient sought relief from his gastric symptoms, that had then existed over two years.

Gastric pain, a sense of fulness, attacks of vomiting, and loss of weight were the chief symptoms when the patient was first seen. It was found that there was marked retention of food, and gastric lavage was resorted to and promptly relieved his discomfort. At this time an examination of his gastric juice revealed the following: Free hydrochloric acid, 32; combined, 20. Total acidity, 76. Two weeks later the free acid was reduced to 12, there was no combined acid, and the total acidity was 30. At this examination lactic acid was present, but

no Oppler-Boas bacilli were found. By use of the suction-pump the sediment of the stomach washings was obtained and examined. Numerous cancer-cells were found.

Dr. John Deaver, in September, 1913, performed a posterior gastro-enterostomy to relieve the symptoms of retention. The patient did well, was greatly relieved, and subsequently gained 44 pounds in weight. He came to Dr. Lyon's dispensary at the Jefferson Hospital on October 8, 1914, again suffering from symptoms of retention, which were relieved by lavage. Several large fragments of the growth were vomited when the stomach-tube was passed. The patient had lost considerable weight during the past few months, but was still 16 pounds above the weight when operated upon.

Dr. McCrae referred to the three years' history of "indigestion" that preceded the diagnosis of cancer, and called attention to recent views as to the number of cases of cancer of the stomach that apparently arise on the site of ulcers. He stated that there could be no doubt but that in a certain number of cases cancer of the stomach appeared on the sites of ulcers, but that he had been unable to convince himself that the majority of cancers of the stomach came from this cause. The suddenness with which gastric cancer often makes its appearance without a previous history of indigestion is against such a view of the general origin of such growths. It will be of interest to observe if cases are later reported in which malignant change has taken place in ulcers not excised at the time posterior gastro-enterostomies have been performed.

Dr. McCrae strongly advised surgical measures for the relief of ulcer in those over forty years of age, and stated that such ulcers are often very chronic and show little tendency to heal. In this particular patient there had recently been a good deal of bleeding, and little could be done other than to make him as comfortable as possible. The diagnosis was an inoperable gastric carcinoma.

The next patient was a white man, a cigar maker, who came to the hospital complaining of two symptoms: First, regurgitation of his food; and, second, distress in the region of his stomach. His family history was negative, and the past medical history revealed nothing important.

In August, 1913, the patient began to be troubled by distress after eating. There was a sense of distress and oppression in the gastric

area which was not relieved until he vomited. Dr. McCrae called attention to the fact that it was not always easy to distinguish between a functional disorder and actual organic disease, but that it was advisable, in such cases, to endeavor in every way possible to decide whether there was organic disease. He mentioned that, in order to make as few mistakes as possible, one must give the patient a thorough examination to rule out reflex disturbances from gall-stones, disease of the appendix, etc. The heart must be examined for organic and functional disease, the lungs and pleurae must be examined for tuberculous lesions which may be the cause of the gastric symptoms. The general condition of the nervous system should also be investigated, as many gastric disturbances are secondary to instability of the nervous system.

Dr. McCrae then called attention to the patient. He was well nourished, had a fair color and a clean tongue. His lungs, pleurae, and heart proved negative on examination. A Wassermann reaction proved negative. The blood count was as follows: Hæmoglobin, 88 per cent.; erythrocytes, 4,900,000; leucocytes, 9800. His abdomen was flat; there was slight general tenderness, but no rigidity. His liver was not enlarged, nor was his spleen palpable. An examination of his stomach contents revealed no retention of food, and the acidity proved to be about normal (free hydrochloric acid, 49; total acidity, 58).

In taking one of the gastric tests (with the tube *in situ*) it was found that at the height of digestion there was fresh blood found in the contents which was not present during the first hour and a half after the meal was given. The presence of blood in the gastric contents, if trauma by the tube can be ruled out as in this case, would lead one to strongly suspect ulcer or neoplasm. An X-ray plate, properly illuminated, so that the class could study it, showed that the stomach was contracted into an hour-glass form. Several other plates taken at intervals during the hours of digestion revealed the same appearance. Dr. Willis Manges, the röntgenologist, diagnosed an ulcer of the lesser curvature.

The treatment was discussed, and Dr. McCrae stated that what one must decide was whether the patient should be treated by medical measures for a time or whether he should be advised to submit to surgical measures at once. The acute ulcer was, as a rule, best treated

medically for a time, while the majority of ulcers, whether acute or chronic, may be greatly improved by medical treatment, even if they are not permanently cured. The treatment consists in giving the patient a thorough rest and learning by judicious experiment what diet and in what quantities are best adapted to the particular individual. There can be no general rule of feeding applicable to all ulcer patients. When the motor power of the stomach is good a more generous diet may be administered, while if the stomach is irritable and food causes pain and distress it is well to give as little food as possible, and proceed very carefully in the transition to a more liberal diet. In certain cases there may be a real advantage in stopping all food by the mouth for several days.

Medical treatment is but a feeble aid to the more important dietary treatment. Subgallate of bismuth, calcined magnesia, and silver nitrate are drugs largely used, while opium and its derivatives are helpful aids when pain is a feature of the case. Chronic ulcers, especially in patients over forty years of age, do not heal with readiness, and after a faithful course of medical treatment has proved unsuccessful surgical measures had best be instituted. Each succeeding year's work of surgical interference in cases of ulcer shows less mortality, and at present the mortality in skilled operators is less than four per cent.

The students were advised to keep a special watch upon supposed healed ulcer patients, and to ever keep in mind the possibility of beginning malignant change. In every patient with ulcer the possibility of perforation should be remembered.

THE EARLY DIAGNOSIS OF GENERAL PARESIS

BY JOHN E. LIND, M.D.

Government Hospital for the Insane, Washington, D. C.

SOCIAL IMPORTANCE

IN perhaps no other department of his humanitarian activities has the family physician a more exacting demand on his resources than in his dealings with cases of mental trouble. A large part of the difficulty attending such situations undoubtedly arises in the undeserved but indubitable obloquy apparently inseparable from afflictions of this sort. For years after he has had pneumonia a man is licensed to buttonhole his friends and bore them with descriptions of his symptoms; a woman may exhibit her pickled appendix to admiring visitors, and a slight affection of the heart is a conversational gold-mine, but an illness of the mind is a *bête noire*, a blot on the escutcheon, a skeleton in the closet.

There is danger that this almost universal attitude will bias the physician too much in the discharge of his duties to the community. He is in a peculiar sense the guardian of the public safety where it is endangered by disease, and no diplomatic scruples should shut his eyes to the onset, often insidious, of mental alienation, and make him temporize with a social foe. This danger is especially true of general paresis, owing to certain characteristics of its incipience. While there are few, if any, disease entities more clearly defined than well-developed paresis, there are also few diseases, mental or physical, which can create more social havoc before being recognized. This is due to several causes.

General paresis does not spring, so far as we know, from predisposed soil. The victim may have lived a happy, successful life and may just be reaching the top of the ladder, preparing to pluck the fruits of industry, when the prizes of life are ravished from his grasp. Too often he is the head of some social or business organization, the *pater familias*, or the small merchant. Before the disease is recog-

nized, he has dissipated the family funds, played ducks and drakes with his income, and ruined his business. His dependents have him committed, only to find that they have delayed too long, and their means of sustenance have been divided between saloon-keepers, prostitutes, and swindlers.

In just such cases does the general practitioner find his field. The psychiatrist, unfortunately, does not see them until the clinical picture is so clearly defined that the veriest layman can detect the presence of mental trouble, and with the obviousness of the mental symptoms disappears, of course, most of the social danger; for it is easy enough to have committed a person who exposes his person, steals openly and recklessly, proclaims from the housetops that he is King Solomon, and writes strangers checks for a million dollars. Such a man is quickly deprived of his power to do harm by the courts. But his legal sterilization often comes too late to prevent polygamous marriages, sexual crimes, and the squandering of patrimony. The members of the family of the unfortunate paretic then inquire—and inquire with some show of right—why they were not warned in time. This is the question the family physician has to answer, and it is one whose necessity he could, as a rule, prevent by the use of a little diagnostic acumen.

THE AGE OF PARESIS

Surgeons in general and gynaecologists in particular are fond of speaking of the fifth and sixth decade of life as the "cancer age." Any tumor-like formation occurring during these years is looked upon with suspicion and must be differentially excluded from a malignant neoplasm. As the vast majority of cases of general paresis occur between the ages of thirty and fifty, why not call this period the "age of paresis"? Why not have stored away in the mental room, probably occupied by far less important details, this generality: "Any mental disorder beginning between the ages of thirty and fifty may be paresis"? Of course, this is only a generality for diagnostic convenience, and as such has its limitations. Many cases of general paresis do not begin until after fifty, and some few under thirty. In dealing with cases under thirty, however, juvenile paresis should be borne in mind, of which condition we shall speak more presently.

THE FIELD OF THE FAMILY PHYSICIAN

Rarely do the relatives, friends, or business associates realize, in the case of the early paretic, that a serious disturbance of the personality is in progress. They see the alterations in conduct, the eccentricities, the excesses, but are inclined to label the trouble as "nervousness" or "overwork," or perhaps refer to his lapses from the moral code as the manifestations of an always present but hitherto concealed depravity. So charitable is man! Those closest to the patient—his family, as a rule—seeing him as they do daily for long periods, fail most completely to recognize the stealthy approach of the disease; they adapt themselves unconsciously to his altered mode of life, and see him become a mental wreck before their eyes without alarm and almost without wonder. Just as the traces of time steal over the face of a loved one without attracting attention from those to whom he is dearest—for, looking at him, they see only the visualization of their ideal—so the relatives of a paretic, having eyes, see not.

No such deluded blindness should veil the sight of the physician, however, and no sophistical hope for improvement or philandering with the ultimate issue should betray him into allowing a case of paresis to progress, undiagnosed, or, diagnosed, to live on unrestrained. No palliation can be found in the plea sometimes made by the general practitioners that they do not specialize in mental disorder. General paresis is, first of all, a physical disease, with a syndrome as well marked as typhoid fever, and the physical signs, as a rule, antedate the mental ones. These physical signs are easily discovered by any practitioner when systematic search is made for them, and do not require a special training in neurology.

To sum up, every family physician should be on guard for general paresis; any suddenly developing eccentricities of a patient, his confidences, the appearance of a speech defect, and other physical signs which we shall enumerate later, should call for a thorough physical examination. In cases where the physician knows or suspects a syphilitic infection some years before, he should be doubly on his guard for evidence of paresis, especially for the period between five and fifteen years after the primary infection, for it has now been established beyond doubt that general paresis is a syphilitic disease. We no longer disguise our etiological uncertainty with the terms

parasyphilitic and metasyphilitic, but state boldly that both paresis and tabes are manifestations of late syphilis, quite as much so as gumma. If they are not so amenable to treatment, the fault is in the anatomical and physiological peculiarities of the nervous system. Every syphilitic, then, is a potential paretic.

EARLY PHYSICAL SIGNS

Every practising physician is familiar (by name, anyway) with the Argyll-Robertson pupil,—that is, the loss of pupillary reaction to light, with the retention of the reaction to accommodation. In paretics we have, as one of the first symptoms, a delayed or sluggish response to light, often a total failure to respond. Speaking generally, we may say that in one of every three early cases of paresis we will find complete Argyll-Robertson pupil, and in four out of five we will find some abnormality of the light reaction. Somewhat earlier in the course of the disease, and therefore of more value to the general practitioner than the abnormal response to direct light, are disturbances of the consensual and sympathetic reflexes. Inequalities of the pupils are found very early in about 80 per cent. of all cases, but, unfortunately, this is a common occurrence in other conditions. More important are the irregularities of the pupils which, Kraepelin states, are forerunners of reflex pupillary rigidity. In testing the pupils, then, look first for Argyll-Robertson, and, if this is found, further examination of the eye may be dispensed with. Not finding this, examine the outline of each pupil carefully about its entire circumference for irregularities, and compare the two pupils for irregularities. Test the consensual and the sympathetic light reflexes.

More obvious even than the pupillary disturbances, and among the earliest signs of all, are the speech defects, which occur in about 80 per cent. of all cases. This is a significant and important symptom, and has the advantage of being rather easily detected. Long ago Esquirol made the generality, "*L'Embarass du parole est une signe mortelle,*" and this is more nearly true than most generalities. The physician may sometimes discover this merely by being on the alert when talking with a patient about some indifferent matter. It may be nothing more at first than a slight stumbling, usually shown in words more difficult of articulation than usual. The most common speech defects noted in paretics are as follows: Reduplication of

syllables; thus, "electricity" becomes "electricicity": contraction of the word as a whole, as "hippopotamus" to "hipmus": the omission of syllables, as "epispal," for "Episcopal": replacement of difficult sounds or difficult transitions by easier ones; "discriminate" may be changed to "distiminate."

A convenient way for testing for them is to request the patient to repeat four or five test words or phrases which comprise most varieties of consonants. Some of those most used by neurologists are: "Methodist Episcopal," "third riding artillery brigade," "truly rural," "hippopotamus," and "perambulator." It will sometimes happen that the suspected patient repeats all of these correctly, although a paretic, and in many of these cases it will be found that he is able to do this by fixing his attention on the word to be said. If, then, his attention be distracted, it will be observed that he stumbles over words of an equal degree of difficulty in his ordinary conversation. This failure to articulate correctly words in ordinary conversation is more significant than failure over test words, for it sometimes occurs that a non-paretic will make a mistake with the latter from sheer nervousness or from overeagerness to make a good showing.

Characteristic of general paresis, even in the early stages, are the paralytic seizures. Any convulsive seizure occurring for the first time in a middle-aged man should arouse our suspicion. In some cases an attack of this kind is absolutely the first symptom of the disease to appear. These convulsive attacks are either epileptiform or apoplectiform in nature, and must be differentiated, of course, from these conditions. Epilepsy is usually easy to exclude from the history, although a recent head trauma may complicate matters. Real apoplectic seizures leave a permanent or lengthy paralysis, while the residuals of a paretic seizure clear up quickly. They may also resemble catatonia, mania, or alcoholism, but they are not usually so difficult to exclude, and, after all, it is not my intention to give much space in this paper to the differential diagnosis of paresis. If the reader is reminded to consider paresis in the suddenly appearing physical and psychical disorders of his middle-aged patients, its purpose is accomplished.

It is not necessary for the general practitioner to make any very detailed neurological examination of the suspected case, nor is he usually equipped for this. Several signs, however, are demonstrable

early in the disease and can be elicited in a few minutes without the aid of any apparatus. These are disturbances of the knee-jerk, hypalgesia during inattention, and Romberg's sign. The knee-jerk is usually increased in extent in general paresis, although it may be greatly diminished or absent. The latter symptom is more important than the former, for there exist more conditions which cause exaggeration of the tendon-reflexes than which cause the loss of them. Another test easy to apply is that of skin sensation. If the paretic's attention be distracted, a pin or other sharp instrument may be thrust through a fold of the skin without his being aware of it. Often, when his attention is called to it, he is greatly surprised at the circumstance. This is a forerunner of the remarkable analgesia of paretics who develop such painful affections as pleurisy or peritonitis and state happily that they feel no pain. A striking symptom often found is the inability to stand erect with the eyes closed. This is Romberg's sign.

The above by no means exhausts the physical signs of general paresis, even in the early stages, but, taken with what mental signs may be present, they make the diagnosis at least very probable, and they are easily elicited by the general practitioner with no special neurological training.

Subjective symptoms may be noted in the early stages. A severe headache often appears early in the disease and is resistive to treatment. The patient may complain of noises in the ear, sparks before the eyes, transient attacks of dizziness, and other manifestations of circulatory disturbances. The special senses may be hyperacute very early in paresis, but this is soon replaced by a blunting of them. Difficulty is often experienced in correctly appreciating the environment. The patient fails to recognize or evaluate objects; a gun pointed at him, or flames in the woodwork of his house do not convey to him any idea of danger; he fails to appreciate remarks which are made about him in his vicinity, and hears one physician tell another one that his case is necessarily fatal with a laugh.

Among the special sense symptoms are sometimes disturbances of smell and taste; the patient may fail to recognize camphor or salt. Symptoms more interesting to the ophthalmologist are hemianopia, especially after paralytic seizures, and optic atrophy, which occurs in from four to twelve per cent. of the cases.

EARLY MENTAL SIGNS

When we come to the consideration of the diagnosis of early paresis by the mental symptoms it is difficult to be concise. One impression which is surprisingly widespread, however, is the somewhat vague assumption that the paretic is, of necessity, exalted and grandiose—the lunatic of the comic papers. While this is a common type of the disease, it must be remembered that these absurdly grandiose delusions often do not appear until comparatively late in the disease. The incipient paretic may make an excellent impression. I recall one who was committed to an institution and, when he appeared before a court, conducted his own case. By a clever cross-examination he led the doctor who testified against him into saying he had read a certain book on nervous and mental disorders, and then he proved to the jury that there was no such book. He was acquitted and congratulated by the latter, and later courted and married the daughter of a prominent family. What his further course was I can only surmise, as he left the city shortly after his marriage. Other beginning paretics have persuaded hard-headed business men to invest in their schemes, and historical instances are not unknown where generals who were in all probability in the early stages of paresis have committed gross tactical errors which were responsible for the loss of battles.

The manifestations of paresis are so protean that any set formula of early symptoms would only have to be amplified by the enumeration of rarer symptoms which, by reason of their infrequency, are easily overlooked. Speaking generally, however, we may say that paresis must be excluded from all mental diseases, especially those of middle life and beyond. It may simulate clinically any other mental disorder, for a time at least.

Speaking a little more specifically, we may say that the sudden appearance of recklessness, extravagance, dissipation, slovenliness, or other unusual symptoms in a person of former conservative habits is always suspicious. The neat dresser comes down to breakfast with no collar on, the temperate man comes rolling home intoxicated, the pillar of the church wines and dines publicly with a prostitute, etc. Or the victim of early paresis may begin to talk of new enterprises he is going into; the floor-walker in a department store is going to open a large theatre and café combined. He will give sixty-day notes

and collect enough from his customers before then to take them up. The cook in a hotel is going to open a large store and handle nothing but the famous sauce which he makes, which will sell for five dollars a pint. These illustrations are quoted at random.

Even in the very early stages of paresis an intellectual weakness is demonstrable. The patient fails to grasp readily simple propositions which are submitted to him; questions are often not heard at all, or, being heard, are answered in such a manner that it is evident they are but imperfectly understood. He does not appreciate subtlety or sarcasm. He is unable to copy simple figures correctly, makes mistakes in calculating, and leaves out words in writing. The memory is impaired, especially for lately-acquired facts. He has to be re instructed about some new detail of his work which he learned only a week ago, or he repeatedly forgets the name of the new clerk in the office. While he may give the year, month, and day correctly, he frequently makes mistakes if asked, for instance, the year it was six years ago, or what month it will be four months from now. In repeating the month of the year and the days of the week backward he is liable to error, and he finds difficulty in repeating a number of three or more digits backwards.

The most striking feature of the case is, perhaps, the patient's usual emotional attitude toward the situation. He is quite pleased with himself, there is nothing the matter with him, he only came to see the doctor to please his wife, etc. This characteristic may be illustrated by the fact that after examining a paretic he may start to leave your office, overwhelming you with professions of gratitude, although you have told him nothing at all about his condition, nor have you offered him any prescription.

Hallucinations and illusions are rare in general paresis, especially in the early stages, but it should be remembered that they may sometimes occur.

The essential characteristic of general paresis, however, is a progressive dementia or enfeeblement of the mental powers. The various bizarre delusions and conduct disorders are but shifting superstructures erected upon this. While he sinks lower and lower in the intellectual scale, he compensates himself for his actual poverty of ideas by fantastic statements of the untold wealth, miraculous power, and magnificent attributes of which he is the possessor. These latter

belong to the classical picture of a well-developed case of general paresis, and have no place in this paper. We have to do with those cases whose symptoms are only slight memory defects, inability to fix the attention, mild euphoria, mistakes in calculating, eccentricities of conduct, slovenliness of habits, etc. Any or several of these symptoms, especially in a middle-aged man, and most especially in a syphilitic, should be the signal for a thorough physical examination.

DIFFERENTIAL DIAGNOSIS

Mentally, as stated before, general paresis may simulate any other disorder, but it is more apt to resemble either manic-depressive, neurasthenia, or arteriosclerotic dementia. On the physical side as well as the mental it must be distinguished from alcoholic pseudoparesis, tabes dorsalis, and cerebral syphilis.

That general paresis may require differential diagnosis from manic-depressive psychosis may, perhaps, be somewhat of a surprise to those general practitioners whose psychiatric experience has been limited. This is due to a rather widespread impression that a general paretic, of necessity, is exalted and shows delusions of grandeur. On this subject I cannot do better than to quote Jelliffe:

"It is to be regretted that the specialist has failed to emphasize this feature, which is of so much value to the general practitioner, and has attempted to excuse his faults of observation behind a pseudo-scientific discussion regarding a 'change of type.' Practically, it is of more value to insist upon the comparative rarity of the megalomanic feature of paresis, since, as the average medical man has been taught to recognize paresis by this sign, it is not to be wondered at that so much delay has occurred before the recognition of paresis. The emphasis should then be laid not upon striking symptoms, but upon the apparently obscure ones."

These cases of depression, occurring as they often do in individuals approaching the involutional period of life, may be mistaken clinically for the involutional melancholia of the older writers, which psychiatrists now recognize as a pure manic-depressive state. Of course, the differential diagnosis of these two conditions is extremely important, from the standpoint of prognosis if from no other, general paresis being fatal within a few years, while the manic-depressive depression tends to recovery and does not of itself necessarily tend to

shorten life. The diagnosis is made by means of the physical signs mentioned above and on the serological findings listed below.

Arteriosclerotic excitement or dementia often resembles paresis more or less closely clinically, but the patient is usually over sixty and has some demonstrable disease of the circulatory system. Further distinction, if necessary, is made by the physical signs and the serological findings.

Cases resembling neurasthenia often present diagnostic difficulties, but in general it may be said that neurasthenia is a disorder of a protracted and gradual onset, springing from predisposed, hereditary, weak, or neurotic soil. The neurasthenic has good insight, magnifies his symptoms, and complains of numerous subjective ones for which no objective cause can be found. He is also not impaired intellectually. The paretic, on the other hand, is inclined to ignore or depreciate his symptoms, even failing to complain of actual physical disease from which he may be suffering; his mental examination shows impairment of the intellectual processes.

From the diseases which resemble general paresis, both at the clinical and laboratory levels, diagnosis is often more difficult and may require consultation with a psychiatrist. These are alcoholic pseudoparesis, tabes dorsalis, and cerebral syphilis.

Alcoholic pseudoparesis is a comparatively infrequent condition which follows prolonged alcoholic indulgences. Both physically and mentally the condition may resemble general paresis very closely, but when alcohol is withdrawn the symptoms fade and finally disappear altogether. It may be necessary to examine the blood and the cerebrospinal fluid to make a differential diagnosis.

For the differential diagnosis of tabes dorsalis, cerebral syphilis, and general paresis the reader is referred to the serological findings given below, which, especially in cerebral syphilis (and I group with this syphilitic pseudoparesis, which is in reality only a descriptive term applied to certain forms of cerebral syphilis), usually begin only a few years after the primary infection, while paresis is usually more than five years after; the symptoms are more apt to be focal than in paresis; the dementia is irregular, while in paresis it is general; insight is more common than in paresis, and the prognosis is better. Cerebral syphilis may be arrested at any point and stay quiescent practically indefinitely.

Regarding tabes, White says:

"From tabes dorsalis the differentiation is not so easy, and, in fact, there remain a few cases where it is impossible, and we must wait for the development of further symptoms. This is due to the fact that in their early stages the physical signs may be identical in the two diseases. When, however, we observe a case in which the tabetic signs are somewhat atypical, with, for instance, preservation of knee-jerks or marked ataxia of the arms, we may be suspicious of paresis, and if with this condition we find associated evidences of mental disturbances a tentative diagnosis is in order."

LABORATORY FINDINGS

In all doubtful cases where general paresis is suspected examination of the blood-serum and spinal fluid should be made. If the examination of the blood-serum gives a negative Wassermann, paresis may be excluded, always providing no anti-syphilitic treatment has been given the case recently and that the reaction was done by an expert. If the Wassermann is positive in the blood, or if the case clinically simulates very closely general paresis, in spite of the negative blood, a lumbar puncture should be done and the cerebrospinal fluid examined.

In general it may be said that general paresis shows four positive features: Positive Wassermann in the blood; positive Wassermann in the spinal fluid; increased protein content in the fluid, and more than ten cells per cubic millimetre in the spinal fluid. Nonne's sero-logical findings in the three diseases—tabes, cerebral syphilis, and paresis—are quoted by Jelliffe as follows:

I. Paresis or tabo-paresis.

1. Wassermann reaction in blood positive (100 per cent.). Pressure increased.
2. Phase I, globulin reaction positive (95 to 100 per cent.).
3. Lymphocytosis (95 per cent.).
4. Wassermann in fluid.
 - (a) Positive—about 85 to 90 per cent. with original method and 0.2 Cc. fluid.
 - (b) Positive in 100 per cent. with larger quantities of fluid.

II. Tabes without paresis.

1. Wassermann reaction in blood positive (60 to 70 per cent.). Pressure usually increased.
2. Phase I, reaction globulin and positive (90 to 95 per cent.).
3. Lymphocytosis positive (90 per cent.).
4. Wassermann in fluid.
 - (a) Original method, 0.2 Cc. positive 5 to 10 per cent.
 - (b) Larger quantities, 100 per cent.

III. Cerebrospinal syphilis.

1. Wassermann reaction in blood positive (80 to 90 per cent.). Pressure frequently increased.
2. Phase I, reaction usually positive, exceptionally negative.
3. Lymphocytosis nearly always positive.
4. Wassermann in fluid.
 - (a) Original methods, 0.2 Cc. positive in about 10 per cent.
 - (b) Larger quantities nearly always positive (of value in diagnosis of multiple sclerosis, cerebral and spinal tumor).

It may be said, then, that a negative Wassermann in the blood-serum excludes general paresis. A negative Wassermann in the spinal fluid, using small quantities, with increased protein content and pleocytosis, means cerebral syphilis rather than paresis, supposing, of course, that tabes has been excluded clinically.

JUVENILE PARESIS

A word or two in regard to the juvenile form of the disease may not be amiss, although it is obvious that failure to recognize this form is not fraught with such danger to the community as may be the case with the adult form. The age of incidence may be said to be, as a rule, somewhere between ten and fifteen years. The symptomatology is the same as in the adult form. The patients dement rapidly, soon come to resemble low-grade imbecility, and, finally, idioey. The wealth of delusional material which is so apparent in the adult is usually lacking in this form. The physical signs are the same.

We should be suspicious of all mental disorder in children, especially when the child has made normal progress up to a certain point and then begins to dement rapidly. If one or both of the parents are known to have syphilis, of course we are doubly on our guard.

The only importance of early diagnosis in these cases is from a prognostic standpoint.

EXAMINATION OF SUSPECTED CASES

It is assumed that as thorough an examination of a case suspected of general paresis will be made as the physician's time and training will permit; if the means of the patient permit, consultation with a psychiatrist should certainly be had. In many cases, however, a tentative diagnosis, amounting almost to a certainty, can be made if the physician will run over a few cardinal symptoms carefully. I will suggest a few of the most striking and easily elicited signs.

The physical examination, especially the neurological part of it, is of the utmost importance. The patient should be examined for eye symptoms, speech defect, disturbances of knee-jerk, Romberg's sign, tremors, and diminished sensibility to pain. In examining the eyes, the reaction to light and accommodation should be tested, the consensual and sympathetic reflexes are examined, and the two pupils observed and compared for irregularities. In paresis the loss of the consensual and sympathetic reflexes often occurs before the Argyll-Robertson pupil. Inequalities of the pupil are common, but, according to Kraepelin, have little diagnostic significance.¹ Irregularities of the pupil are of more importance, and the Argyll-Robertson pupil the most important sign of all. Kraepelin does not believe that this occurs without syphilis. The speech defect has been described above. The knee-jerks are usually increased in extent, but their absence is of more diagnostic importance. The patient sways with closed eyes and shows tremors of the closed eyelids, protruded tongue, and extended fingers. The tremor of the tongue is a coarse anteroposterior vibration, to which condition the name "trombone tongue" has been given. If the patient's attention be distracted, a pin can often be thrust through a fold of the skin and he is not aware of it until his attention is called to it. If he does feel it, he does not express pain, but merely comments on it casually.

¹ Gordon, of Philadelphia, thinks otherwise. See reference No. 2.

The mental examination of these cases may be as thorough as possible, and unless the case presents a prominent delusional system of a bizarre or grandiose type, which, as I indicated above, is the exception rather than the rule, it will be necessary to make use of a rather complete examination. The reader should consult "A Minimum Mental Examination," in the fourth edition of White's "Outlines of Psychiatry," for a succinct mental examination.

The earliest mental defects to appear in these beginning paretics are those of memory, and these are often not apparent in an ordinary conversation. The physician must not be misled by the patient's readiness with dates, for he frequently supplies something plausible when the correct one escapes him. He should be asked to give a synopsis of his life and a complete account of events for the past three months. If then the physician takes notes of his account and asks him a day or so later (or even, in a great many cases, an hour or two later), many discrepancies will be found even in dates or periods of time synchronizing with important events of his life.

To test his powers of attention and retention, a four- or five-line news item from the daily paper may be read to him with the warning that he will be asked to repeat the substance of it. It will often be noted that, in spite of this warning, his attention has been imperfect and he either repeats the story very briefly, leaving out essential details, or he supplies circumstances from his own imagination. In performing calculations, even in the multiplication table, he makes mistakes, and if we happen to know that he is a well-educated man, these are obviously pathological. He will often fail to copy a simple diagram correctly, or is unable to construct a figure similar to 555555, using the figures 3 or 7. He does not grasp the proposition at all.

Many mental defects may be brought out without exciting the suspicion of the patient by questioning him along the lines of his occupation. It will be found that the lawyer can give you no opinion regarding a simple legal matter, the paper-hanger gives conflicting or absurd estimates for papering the walls of your office, and the bank clerk is unable to do a simple sum in compound interest without numerous mistakes and erasures.

Sometimes the patient shows no gross impairment in performing the above tests, or perhaps his education has been so elementary that he cannot be expected to do them perfectly. If then an inquiry be

made into his plans for the future, his judgment will be found to be defective. He may be contemplating absurd purchases, hazardous business experiments, and wildest investments of all kinds.

I shall not dwell upon the grosser psychotic manifestations; they can be found described at length in any text-book. Reference No. 7 is a particularly good account of them. Any failure to measure up to normal in the mental examination, particularly in a subject who holds a good social position (showing that he has been an efficient individual), is suspicious; if this is combined with any of the physical signs, the diagnosis is rendered extremely probable. The history of recent eccentricities, unusual acts, sexual and alcoholic excesses, etc., is of course extremely suggestive.

ILLUSTRATIVE CASES

The following case shows the clinical form general paresis often takes in the early stages. I will take the liberty of making a running comment on this case:

CASE 21221.—Colored male, aged fifty-two years. The family history is unimportant. Patient had a common school education; left school at about fifteen, and worked first as a day laborer and later as a coachman. He was working at this latter occupation when he was taken ill. His wife died, after an illness of three months, in May, 1913. During the whole of her last illness the patient sat up nights with her and went about his usual vocation in the daytime. He lost considerable weight during this time, and worried a great deal about the expenses incident to the illness. Following his wife's death he continued to worry, suffered from insomnia, was nervous, and his appetite was poor. He went to see a physician, who told him he was suffering from a mild case of neurasthenia. It is not known what treatment was ordered, but the patient grew worse, made mistakes in his work, and finally lost his position. After this he had an attack of terror, imagined that enemies were after him, on one occasion went into the bathroom and turned on the gas; on another occasion secured a razor and attempted suicide. He was then committed to the Government Hospital for the Insane. The following description of his condition at that time is by Dr. Glueck, of this hospital, and is so excellent I must copy it verbatim: "On admission he presented a typical clinical picture of the depression formerly called involutional melancholia. His facial expression was sad, he took no interest in his environment, and spoke somewhat vaguely of crimes he had committed. He was quite agitated when questioned, stating, in a lachrymose tone of voice, that he is certain that what he says will be used as evidence against him, but says he has no alternative and he guesses he deserves everything that will be done to him. When an attempt is made to reassure him, he says, 'Maybe that's so, but you have your detective standing outside the door listening, just the same,' and would not be satisfied until he went to the door and looked for himself. It seems that for a number of years various officials

in the department where he worked had been in the habit of presenting him with discarded furniture, from time to time, and he is now convinced that these things were given him so that a case of theft could be worked up against him. He is certain, since he left his home, detectives have been there and searched the house and, of course, found all this furniture there, which would make a serious case against him. At this point he broke down and wept bitterly, saying that he ought to be in the penitentiary, and that he had also taken pencils belonging to the Government which clerks had given him, although they had no right to do so. He continues in this self-accusatory strain, and it was learned from his relatives that for several months he had been unnecessarily worried about his financial status, so much that in an attempt at economy he would frequently eat nothing but one bowl of soup in twenty-four hours."

It should be noted that when this case was first seen by a doctor it was called neurasthenia, and probably did present features suggesting that disorder. A little later the case looked like a typical depressed phase of manic-depressive psychosis, and this was its appearance when admitted to the Government Hospital for the Insane. However, a physical examination, made shortly after admission, showed tremor of the eyelids, tongue, and hands, and increase in extent of the deep reflexes. The pupils were very small, slightly irregular, and the reaction to light was sluggish. The patient and his relatives absolutely denied all history of syphilis, and, aside from the eye symptoms mentioned above, there was nothing in the physical examination to suggest it. The Wassermann reaction with the blood-serum was complete positive, and with the cerebrospinal fluid single positive. The protein content in the latter was increased, and the cells per cubic millimetre were 152. About three months after admission the patient became quite elated. Four months after this he developed a series of convulsions and died.

It is almost superfluous to remark that a careful examination by the first physician who saw the case would have caused the patient to seek hospital treatment at once and prevented his suicidal attempts. Fortunately in this case, his social position was such that he was not able to do any serious harm before being committed. The next case, however, illustrates what may happen in these cases.

This case (No. 18405) was a white male, well educated, who was admitted to the Government Hospital for the Insane when forty-four years of age. I am indebted to Dr. Meyer Solomon, formerly of this hospital, for the following description of the case. The duration of the disease on admission appears to be about six years, which is, of course, much longer than the average. In 1903 he left his wife and six children in a Southern city, went to another town and

married a widow, with whom he lived one year and left. Shortly afterward he appeared in another Southern city and again married a widow. He lived with her about three and a half years. During this time he rarely worked, made many purchases, and charged them to his wife. He left her suddenly and located in another city, from where he corresponded with a Washington widow for three or four months. In his letters to her he claimed he was an electrician, well-to-do, a Mason and an Odd Fellow, none of which things were so. Pictures were exchanged and their marriage arranged. He wrote her he would arrive on the night set for the wedding, attired in evening clothes, a high hat, and carrying a gold-headed cane. Everything was prepared at the widow's home that night; an elaborate supper was set and the guests assembled. The patient did not arrive until very late, and then was minus dress clothes. Things looked rather queer to the widow and her friends, but he made some more or less plausible excuse, and they were married that evening. The daily papers made a good deal of the affair, calling it a "romance of middle age, spanning the miles that separate Washington and _____," and stated the bridegroom, "a bachelor (!), who is now winding up his electrical business in _____ preparatory to moving to the capital, where the home of his bride will become a home of honeymoon."

The next morning after the wedding the bridegroom made a confession; said he had lost \$800 in a bank, and that an Odd Fellow's widow had cheated him out of \$400 more, leaving him with only \$1.35 in his pocket. Although naturally disappointed, the bride encouraged him to try to obtain employment, in the belief that he was a good electrician. The patient went out every day, ostensibly looking for work, but never found any. While at home he seemed in a dazed condition, and all the relatives and friends of the wife suspected that there was something wrong with him. The wife herself still clung to her illusions. Two or three months after the marriage a minister obtained him a minor position for two months only, and when this ended he did no more work. About this time his eldest stepdaughter died, and the patient was very much affected by this. He began to get things at the druggist's, grocer's, and other places where he knew his wife's credit was good, and charge them to her. The further progress of his symptoms is described by his wife:

"He was constantly cleaning up his clothes, packing them and unpacking them. He would make plans to go back to Texas, and then change his mind. He had trouble with his speech and stammered. He did not sleep well at night, would prowl around, went out into the streets and wandered aimlessly about. He claimed he owned the whole world, went to a life insurance company and ordered them to pay a large sum of money to his wife on a policy which he said he owned. He thought he had a great position, was a great individual in every walk of life, was head of the police department and going to be President of the United States. At times he would become sad and depressed, could not bear to listen to music or anything that was sentimental. Sometimes he would become very excited and violent, would fly into fits of rage over trifles. He began to mispronounce and leave out words. He was always on the go, but never got anything done. He used gasoline to clean his clothes, and one day set fire to some of them."²

² The above two cases are abstracted from the records of the Government Hospital for the Insane, by the kind permission of Dr. W. A. White, Superintendent.

Patient was then committed to Washington Asylum Hospital, and from there transferred to the Government Hospital for the Insane. His polygamous activities then came to light. I shall not attempt to picture the distress of his latest wife when she learned of his career, except to say that the spectacle was pitiable. The patient here showed the physical and mental signs of general paresis, and his subsequent history is unimportant for our purpose.

It is hardly necessary to comment on these two cases. The first showed an onset which resembled neurasthenia and, later, melancholia. The delayed diagnosis fortunately caused no especial harm. In the second case the disease was probably present for about six years, judging by the history. Of course, there were almost certainly remissions during that time. It strains our credulity to suppose that this second patient was not seen one or more times by physicians since the onset of his disease. Several innocent families could have been saved from grief, social injury, and possibly hereditary taint if the condition had been recognized earlier.

SUMMARY

To recapitulate: Early paresis, if unrecognized, may cause suffering to the families and friends of the patient, owing to the fact that its victim is often in a position to control large sums of money. The usual age of incidence is somewhere between thirty and fifty, and the family physician should be on his guard against suddenly-developing physical or mental diseases during this period of life, especially in syphilitics. When the disease is suspected the diagnosis should be confirmed immediately; when it is positive he should lose no time in restricting the patient's activities. He should be familiar with the early physical signs, the eye symptoms, the disturbances of the knee-jerk, Romberg's sign, the speech defect, and the diminished sensibility to pain. He should likewise be thoroughly aware that grandiose delusions (megalomania) are not apt to be present in the early stages. He should look rather for memory defects, faulty judgment, lack of attention and retention, and change in habits. He must exclude tabes, cerebral syphilis, and alcoholic pseudoparesis. In all doubtful cases the blood and cerebrospinal fluid should be examined by the best pathologist in the community. A positive Wassermann in the spinal fluid, increased protein content of the latter, and pleocytosis mean, as a rule, general paresis. In mental disorders of children juvenile paresis should be excluded.

In conclusion, it might be well to keep in mind that with every incipient case of general paresis the family physician diagnoses and causes to be committed he performs a service to society in general and to the patient's family in particular, and he may be the means of preventing the destitution of families or even murder itself.

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THE HEART IN SYPHILIS

BY HARLOW BROOKS, M.D.

Professor of Clinical Medicine, University and Bellevue Hospital Medical College;
Visiting Physician to the City Hospital and to the Montefiore Home and
Hospital for Chronic Diseases; Consulting Physician to the Ossining Hospital
and to the Union Hospital, New York City

In presenting this *résumé* of the work which we have done in regard to this subject I wish to point out that I do not propose to discuss syphilis of the heart, but rather the condition of the heart in syphilis, just as, for example, we would consider the heart in scarlet fever, not scarlet fever of the heart. The point which I thus raise is that the changes in the heart due to syphilis may not necessarily be indelibly luetic in themselves; thus fatty degeneration, brown atrophy, or ischæmia of the heart frequently develops as a result of lues, yet we could not correctly speak of these lesions in themselves as syphilitic. Doubtless one of the chief reasons that this subject has been so long neglected and misunderstood is because pathologists in particular have long considered only those lesions of the heart as syphilitic which are stamped with the hall-mark of the gumma or which present unmistakable evidence of active luetic change. As a result of this false position, appreciation of the very important rôle which the heart plays in this protean infection has been in the past mostly underestimated and underconsidered.

In nearly all the older discussions of this subject the statement is made or the impression given that syphilis does not affect the heart until late in the disease. Yet one of the first and most striking findings of our study has been that involvement of the heart appears very early in the infection, quite as one should expect to be the case in a septicaemia such as lues is.

Carrol and I have observed twenty-four cases in which cardiac involvement occurred during the secondary stage of syphilis. Of this series, two died of cardiac failure, both verified at autopsy, and the remaining twenty-two entirely cleared up as to cardiac disturbances

under specific medication alone. A twenty-fifth case, to be mentioned later, entirely failed to respond to treatment.

In by far the most frequent instance,—that is, in two hundred and seventy-six of the three hundred cases analytically studied by us,—the lesions did not come under observation until late in the third stage and long after the time of primary infection, for the most part. In one of our fatal cases death took place just as the secondary rash began to appear and before the diagnosis had been made. The immediate lethal cause was a perforation of an aneurismal dilatation of one of the aortic sinuses. It thus appears that, in so far as involvement of the heart is concerned, it begins among the early indications of the general septicæmic condition, and danger from involvement of this organ persists from this time on until actual cure or death has taken place. Of two hundred cases analyzed in this regard, thirty-three occurred in females and one hundred and sixty-seven in men. We believe, however, that these figures only correspond to the relative entrance percentages of women as compared to men. Among women the average age of reporting for treatment was 38.1 years, and of the men, 44.75. Our impression would corroborate this apparently greater susceptibility on the part of women, though it may well be due to the fact that nearly all the men have not so generally neglected the early treatment of the primary infection as is probably the case with women. It is interesting to note, in passing, that fifty-three of the two hundred cases examined as to this particular showed postinfection fertility. It is evident, as we have noted elsewhere, that in the past clinicians have probably overestimated sterility as a result of lues.

As to the character of the lesions found in these cases: My anatomical data have been derived from the analysis of the lesions found in fifty consecutive cases of syphilis which came to autopsy in my service. By far the most frequent heart tissue involved was the myocardium, which was found to be diseased in forty-four of the fifty cases. The most frequent myocardial change (out of forty-four cases) was a fatty degeneration. In five instances this was associated with fibrous lesions; parenchymatous changes were associated in six cases; probably, however, this last change was due not to luetic disease, but to subsidiary or terminal conditions. In most cadavers the fatty and fibroid alterations were apparently dependent on coronary disease.

Brown atrophy was found alone in seven cases, and this, too, was believed almost, if not always, due to changes in the coronary arteries.

Pure fibroid changes were found in four instances, but associated with fatty degeneration and infiltration in five others, so that a total of nine out of the fifty cases is recorded. This was associated three times with cardiac aneurism, due to the fibrosis, and in all these this was the direct cause of death. Study of this important lesion led me to conclude that the fibrosis originates in one of two manners. It may result from a coronary fibrosis or an obliterative endarteritis which has brought about a myomalacia with consequent fibrous replacement, or it may follow from an elemental syphilitic inflammatory process which has its acute origin as a true syphilitic myocarditis, six instances of which were studied in my series. The frequency of this change in the papillary muscles in particular and its consequent effect on the mechanism of the heart valves is obvious.

True gumma of the heart muscle was found in but five of my autopsy cases, though Mracek found it present in ten of his fifty. Buschke and Fisher¹ and Simmons² were apparently the first to demonstrate the presence of the spirochætae in the heart-muscle lesions, but the most conclusive work of this nature has been that of Warthin,³ who showed the almost universal presence of these organisms in the heart-muscle lesions, even where the microscopic changes were otherwise very slight.

Pericardial changes were found in seventeen of the fifty cases. Contrary to Billings, however, I do not believe that syphilis in itself acts as a determining factor to any very considerable degree in regard to pericarditis. My opinion as to the significance of certain lesions of the epicardium is quite different, however. The most frequent epicardial change appears to consist of the formation of white, slightly raised, opalescent round or oval areas which are microscopically made up of hyperplastic endothelial cells and connective-tissue fibrils more or less infiltrated by lymphocytes. This was found in twenty-eight of the fifty cases. In some instances slight calcification takes place in these lesions, and in nearly all a definite relationship between them

¹ *Deutsche med. Wochenschr.*, Nr. 19, 1906.

² *Münch. med. Wochenschr.*, 1906, p. 1550.

³ *Trs. Assn. Am. Phys.*, May 13, 1914.

and a perforating arterial termination can be shown. I believe that the lesion represents a terminal periarteritis, and that it is, perhaps, analogous to leucoplakia, such as is seen on the mucosæ.

Endocarditis was found in thirty-seven cases, seventeen of which showed involvement of both aortic and mitral segments. Seven instances of pure aortic disease were found, but none of pure mitral involvement. In three instances the aortic, mitral, and tricuspid were all involved, and the mitral, tricuspid, and semilunar in one. In four there was universal involvement of the endocardium of such nature as to clearly evidence its specific character. It is by no means assumed that the endocarditis was exclusively, or even mostly, definitely syphilitic.

In regard to endocarditis, it is not wise to draw conclusions from so limited a number of instances, but I thoroughly agree with popular opinion as to the very general predilection of this infection for the aortic segments, probably largely due to their close proximity to the coronary vessels and the aortic sinuses, which are so frequently invaded by this disease. So very much has been written concerning the character of aortic disease in syphilis that it seems unnecessary to discuss it more fully here than to admit its frequency and to say that the most frequent type, as it has occurred in my autopsy service, has been an atheromatous process in which the calcified plaques alternate with ulcerated and degenerated foci. Except in treated cases one may usually demonstrate syphilitic areas in most endocardial lesions which show activity present, even in many long-standing instances. Such areas in the conus arteriosus are mostly definitely located about the *vasa vasorum*, and it is my impression that most aortic valve lesions also originate in such manner.

Aneurism of the conus arteriosus is apparently a process absolutely connected with the subject of aortic disease. Space does not admit of its detailed discussion here, and for this purpose readers are referred to the excellent researches of Longcope.⁴ Ten instances of thoracic aortic aneurism were found in my fifty cases, giving, I believe, one of the highest percentages of aneurism formation yet reported. Two of these developed from the sinuses. In most of my cases aneurism has appeared a considerable time after the primary infection. An average

⁴ *Arch. Int. Med.*, vii, 1913, p. 15.

time (of diagnosis) would, from my statistics, be in the neighborhood of twenty years after the infection; but of two instances, one developed within six months after the appearance of the primary sore, and the other, previously mentioned, died from the perforation of an aneurism of the sinus just as the secondary rash was beginning to become apparent.

Syphilis has been recognized for a very long time as one of the most frequent causative factors of coronary disease, and my studies fully corroborate this commonly-accepted conclusion. In thirty-five of my fifty autopsy records, disease of the coronary arteries was present to a relatively greater grade than the general arterial changes. In other words, a definite selective tendency on the part of the syphilitic virus for these structures appears to be manifested. Age seems to be largely a negligible factor in this regard, for this lesion was found far advanced in cases respectively twenty-three, twenty-six, and twenty-eight years of age. The occurrence as well as the grade of the coronary lesions seems to depend on the activity rather than the duration of the disease or on the patient's age. All grades and types of coronary disease are manifested in this condition, from extreme grades of calcification with dilatation, and narrowing down to active ulcerative and infiltratory changes of definitely luetic type which contain spirochaetæ in abundance.

There is no doubt but that the earliest, most frequent, and most important changes induced by syphilis in the heart and aorta originate in and about the nutrient vessels. This is clearly indicated by a study of the epicardial spots mentioned and by the early changes in the heart muscle, which can in nearly every instance be connected directly with the blood-vessels. This particular muscle lesion, though independently observed and so reported by me,⁵ had been previously accurately described and its full import noted by Isaac Adler.⁶ Warthin has since⁷ again described this lesion, noting, in addition, the abundant occurrence of spirochaetæ in it. From our anatomical studies we know that this change, originating as it does in the terminals of the coronary system, occurs very early in the disease and is doubt-

⁵ *New York Medical Record*, Feb. 24, 1912.

⁶ *Trs. Assn. Am. Phys.*, May 3, 1898.

⁷ *Trs. Assn. Am. Phys.*, May 15, 1914.

less accountable for the early symptoms of cardiac disturbance which we shall show first appear at this time. This lesion is also doubtless the precursor of cardiac fibrosis; it is an introduction to coronary end- and periarteritis, the probable points from which gumma originate, and, therefore, beyond doubt, the most important single lesion in syphilitic involvement of the heart. I also wish to point out at this time that the earliest alteration is an infiltratory one, followed by cellular fibrosis, succeeded by necrosis. Up to this point the lesion is a recoverable one, capable of being removed by appropriate medication, but when necrosis or adult fibrosis has taken place, even the most vigorous treatment cannot cause complete absorption without a resulting scar of greater or lesser extent.

The Symptoms: In our analytic study of the symptomatology of cardiac involvement in syphilis two hundred cases have been collected.* Of these, ten instances were in the secondary stage and therefore represent, I believe, the earliest clinical evidences of the lesions described. I have since studied fourteen other instances which all corroborate our conception of the early symptomatology of this complication.

The most frequent sign referable to the circulatory system in the secondary stage of the infection is a soft systolic apical murmur, occasionally, but not commonly, transmitted to the axilla. This murmur becomes more evident on exercise when a disproportionately large degree of dyspnea and a slight cyanosis develop, very often with vague pain referred to the retrosternal region. This pain, at times associated with tenderness over the sternum, is also often well marked even when no exercise is given. Disturbance of cardiac rhythm and tachycardia are almost universal when the heart becomes involved. Although I believe that in several cases involvement of the mitral ring or of the papillary muscles was present, in no early instance have we discovered postmortem demonstrable valve involvement in this stage of the infection; none the less, in several cases the signs of a mitral stenosis have been closely simulated, even if not present. As reported in two of our cases, death was the first observed symptom; two similar but unpublished instances have been reported to us privately. In my opinion, the reason that symptoms of cardiac invasion are not

* *New York State Med. Jour.*, June, 1913.

more frequently reported in secondary lues is, first, because a large percentage of these instances develop under the observation of dermatologists or syphigraphers, who are less likely to investigate the heart status, or, lacking interest in the subject, to record it; and, second, because the signs and symptoms promptly disappear under specific medication. In one of our cases, for example, a very aggressive pericarditis developed, to promptly disappear under salvarsan and mercury administration. Since practically all instances of secondary lues are promptly and correctly treated in this stage of their infection, indications of circulatory disease are, therefore, not frequently detected. Enough has been said, however, I believe, to point out the necessity of forbidding physical excesses in cases of secondary syphilis, at least until they have been brought well under the effects of specific medication. I further believe, from the character of the symptoms and from the microscopic lesions found at postmortem in our two fatal cases, that the lesion causing these symptoms is chiefly the periarterial inflammatory or granulomatous one mentioned above.

In many, perhaps most cases, symptoms of heart involvement are not complained of until comparatively long after the primary infection, and, probably due to the wonderful recuperative power of the heart muscle, they may remain fully compensated until approaching old age or an extraneous incident reveals them.

Although in the past it has been apparently largely assumed that symptoms of cardiac involvement in syphilis were infrequent, of the two hundred cases which we have examined as to this aspect of the complication one hundred and sixty-four came making complaints of circulatory discrepancies. Apparently the reason that the relationship of these complaints and signs have not more generally been attributed to their real cause, syphilis, is because physicians, in dealing with cardiac diseases, are frequently content with the detection and definition of the lesion and do not look back for the cause, a point to which Cabot has recently⁹ called particular attention by his suggestive classification of cardiac disorders from the standpoint of etiology. In our remaining thirty-six cases the circulatory lesion either caused unexpected death or was discovered incidentally on physical examination or at autopsy.

* *Trs. Med. Sect. Am. Med. Assn., Atlantic City, 1914.*

Naturally the character of the symptoms in any instance depends on the lesions present, and, from what has been said as to the pathologic anatomy, it will at once appear that the symptoms and signs may be very variable, but there are certain conditions which appear with sufficient constancy to suggest in themselves the strong probability of lues being concerned in any case of circulatory defect.

The most constant symptom which has appeared in these cases has been dyspnoea. The degree has, of course, varied greatly, but it has been in some instances about the only symptomatic indication of heart involvement. The closely-allied sign of cyanosis is found relatively less commonly, but it was observed in one hundred and four instances,—that is, in a little over one-half of the cases.

Precordial tenderness is a not infrequent symptom. It was present in fifty-two of our cases, and is occasionally so marked that considerable distress may be shown simply as a result of the percussion necessary to define the heart borders. Deep, firm pressure over the precordium brings out exquisite tenderness in a very notable number of cases. From its character I do not think that this is simply the Head-zone hyperesthesia, but that it is a true sign of myocarditis. Pain in the precordium was complained of in one hundred and nineteen of my series of cases. This is often a very early symptom of heart involvement in syphilis, and not infrequently is well marked even before physical examination reveals anything definite or even highly suggestive. Pain is one of the most persistent symptoms of heart involvement in this disease. In the early cases it appears to be due to direct inflammatory involvement of the heart muscle, and in the latter stages, where this has subsided, perhaps to slight dilatation or to fibrosis. In most cases the pain is quite definitely located in the region of the sternum or at the apex, but occasionally it is described as reflected into the back, and particularly toward the blade of the left scapula.

Paroxysmal pain in the pectoral region and reflected down the left arm or elsewhere,—that is, true angina pectoris,—was found in eighteen of our two hundred cases. In minor grades it is probably much more frequent, but in the instances mentioned it was accompanied by symptoms of terror, ashen countenance, and profound prostration. When one considers the great frequency of coronary

involvement in this infection, we cannot but wonder that so relatively few cases present the typical picture of angina pectoris.

Disturbance of rhythm appears very early. We have already mentioned its appearance in secondary stage infections. In these instances it is doubtless due to disrupted or disturbed muscle transmission following the active myocarditis characteristic of this period. In the latter periods of the disease more definite disturbances of rhythm appear. Six instances of typical heart-block have occurred among my patients, and many other such instances are reported in the literature. In such instances, of course, the lesion is usually insulae of fibrosis or gummatous, situated near or in the bundle of His.

Notwithstanding the chronic nature of the heart invasion, in but few instances have we found evidences of long-standing cardiac inadequacy shown by clubbed fingers and toes. This may be because, as a rule, this complication occurs in adults, and clubbing of the extremities is unlikely to appear in typical form unless the circulatory defect has occurred in relative youth.

The symptom of insomnia has been a prominent one in twenty-five per cent. of our cases. This common symptom has been more frequently found registered in the nurses' notes than among the complaints of the patient. It is probably an indication of circulatory deficiency or instability in the cerebral vessels.

In addition to these symptoms which appear in heart involvement in syphilis are also those signs and symptoms which particularly indicate the type or location of the special lesion present in any case; these do not require discussion in this place. I do wish to point out in particular, however, that the general symptomatology of heart involvement in syphilis is indicative of muscle disease rather than of any other lesion, and, in my opinion, the *lesion* of the heart which occurs most constantly in syphilis is one of the *muscle* rather than of the valves, pericardium, or aortic arch.

The *diagnosis* of heart involvement in syphilis resolves itself into the diagnosis of the syphilis and that of the special heart condition. Although the last may often, if not usually, present the greatest difficulties, it is by all means the first which is of greater importance.

Since many instances occur in cases in which the typical picture of a syphilis has disappeared or was never present, the diagnosis of syphilis may be by no means an easy matter. In the past we have

been in large part dependent upon history in this regard. We cannot but realize the diagnostic inadequacy of history, because many patients fail to observe the not infrequently minor and apparently insignificant lesions which may appear in primary and secondary syphilis. There is a still larger group of patients who deny the infection wilfully, perhaps for social reasons. According to our observation, a positive or strongly suspicious history of the general infection can be obtained in only about 30 per cent. of cases as they appear in an internal hospital service. Adroit questioning may, of course, elicit, quite without the patient's knowledge, the history of a skin rash, of persistent sore throat, severe headache, and the like. There is still another large group of patients who deny previous infection because they can see no logical relationship between "heart trouble" and a local sore followed by a skin rash which perhaps occurred years ago, and any direct questions in this direction may be looked upon as undue curiosity on the part of a physician, not to be encouraged by frankness on the patient's part. After a wide experience I have come to absolutely disregard a negative history in suspicious cases.

The finding of associated lesions of a suspicious character is often of great assistance. Such evidence comprises tibial nodes, chronically inflamed joints and tendons, enlarged cuboidal glands, scars in the throat, on the tongue, or upon the genitalia, and evidences of old skin diseases unaccounted for in the patient's history. Luetic lesions of the central nervous system were found, for example, in 20 per cent. of the cases analyzed by us in this respect. Associated lesions of one or another character were found in one hundred and eleven of our two hundred cases.

The Justus test can rarely be utilized in long-standing cases, such as make up the bulk of the instances which appear in the practice of an internist, because of the great frequency with which mercury has been employed at least at some time in the history of practically every patient; its value is very questionable, at the best.

The therapeutic test in the diagnosis of these heart complications is, unfortunately, not generally resorted to. It has proved of very great and frequent value to me, especially in cases in which no positive evidence could be obtained otherwise. In so far as I have been able to discover, this measure is mentioned in no general or special work dealing with heart diseases, though it is universally mentioned in

practically all discussions of disease of the liver, deep tumors, and in brain and spinal-cord lesions. When we take into consideration the very great prevalence of luetic disease of the heart, the direct application of the method should appeal to every one. The value of the method is further emphasized in that, even in chronic and long-standing instances, a benefit, though perhaps a very temporary one, is almost always apparent, while in acute cases the almost invariable disappearance of the signs and symptoms forms one of the most impressive results seen in medical practice. To satisfactorily make this test, the most conclusive results are obtained by the use of mercurial inunctions or by the administration of a few intramuscular injections of mercury salicylate. Of course, salvarsan may be similarly employed, but mercury in some form is generally much more applicable. To be positive it is, of course, required that marked improvement in the heart condition should become evident without the use of any of the customary heart drugs.

I cannot speak too highly of the use of the Wassermann reaction for the recognition of luetic taint in cases of cardiac disease. While in some instances of unquestioned infection it may persistently remain negative, it is by all means the most certain and valuable sign in the recognition of the disease which we yet have to guide us. One must remember that the reaction may be negative in very early cases, in several of which, after heart complications had appeared, it became positive. One may also find it negative in cases which have been treated, though inadequately, in so far as the heart lesion may be concerned. The Wassermann reaction may also occasionally be continually negative in cases in which spirochaëtae have been subsequently demonstrated at postmortem, and also in the more frequent instances in which specific treatment has been rewarded by brilliant recovery.

There is a considerable group of cases which originally give negative Wassermann reactions, but after one or more doses of mercury have been administered a very conclusive positive reaction may appear. It is my custom, because of this fact, when a negative Wassermann is found, to try provocative doses of mercury, and in a very considerable number of cases positive results have been then obtained. From our considerable experience with circulatory syphilis I am of the opinion that the Wassermann reaction is rather

more constantly positive in cardiovascular than in most other instances of deep visceral lues.

As regards the technic preferably employed, we have found the old Wassermann method to be the more reliable as compared to the newer and usually more sensitive modifications. My results with the luetin reaction have not been satisfactory, but I do not feel that my experience has as yet been sufficiently continued to justify me in condemning it.

Finally, there are cases of heart disturbance in which, though all positive confirmatory evidence is wanting, treatment along specific lines brings about recovery. Such instances have, however, not been considered in our analyses. Cabot, in his futuristic classification of heart disorders according to etiological factors, has included as "probably syphilitic" many instances of muscle disturbance which he could not otherwise account for. If this point is borne in mind therapeutically, no harm can follow, and I am certain, from my experience, that certain cases, otherwise hopeless, will recover as a result.

As to the diagnosis of the *heart lesion*, the usual methods are to be employed. They do not need to be detailed here. But I wish to particularly point out the fact impressively shown by our cases and by our anatomical studies, namely, that in practically all, the heart muscle is seriously involved, and in most cases this is by all odds the most important lesion. Experience has taught me that even in cases in which symptomatology and signs indicate an aortitis, for example, apparently with slight disturbance of the muscle, response to treatment has shown that many of the symptoms supposedly due to the aortitis were, in reality, defects of muscle action.

Treatment divides itself naturally into that designed to directly attack the basic infection, and those measures directed symptomatically toward the circulatory system. It hardly need be said that of these two by far the more important are the general specific methods of treatment. In acute instances and also in a not inconsiderable number of those well advanced this is all that is ordinarily necessary.

Throughout, however, one is impressed, in the management of these cases, with the fact that treatment must be definitely individualized—no one or several routine methods are satisfactory; each case is a law to itself.

Inasmuch as the basis of treatment in all cases is specific, it is,
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of course, impossible to completely disassociate some of the good results following from the action of these drugs on other viscera than the heart, and notably on processes which may exist in the arteries.

In acute and active cases of syphilis in which the heart has become obviously involved promptness of treatment is, of course, very necessary, precisely as in diphtheria, scarlet or rheumatic fever in which the similar complication has developed. The first effort should be to conserve the heart as much as possible from all unnecessary strain. Rest in bed or in as near a reclining posture as dyspnoea admits is to be enforced. Unlike the comparative conditions mentioned we possess in syphilis specifics capable of promptly attacking the disease process; not only in eradicating the causative factor, but in promptly removing the foci of diseased tissue as well, hence the immediate danger is much less.

In all such instances mercury or salvarsan should be given at once. When the general condition of the patient indicates good resistance, and where at the same time the progress of the cardiac complication seems to be rapid, immediately endangering life, I prefer to give salvarsan first, because I believe that it exerts the most immediate effect on the disease progress. In these aggressive cases it must, however, be first given in small doses, for circulatory failure, apparently from the sudden liberation of some toxin, may lead to death or serious collapse. Not over 0.1 to 0.3 g. of old salvarsan should be first given, or a proportionate amount of neosalvarsan. If no serious reaction follows, the drug may be again given after three days, using now a larger dose and repeating thereafter as frequently as seems indicated. Where salvarsan is first given in these cases one is certain to eventually meet with unfortunate experiences, but, on the other hand, the relief from the drug and the almost invariable prompt check put on progress are most striking. In my observation, most serious accidents have developed after salvarsan in cases showing serious disturbances of rhythm,—*i.e.*, "muscle cases." I have given salvarsan only intravenously. It is quite possible that small doses frequently given by one of the newer intramuscular methods may give as good or better results with less danger.

Where time seems less pressing I strongly advise that mercury be used as the initial drug. Equally good effects follow as with salvarsan, though more slowly. I have never yet seen collapse follow

vigorous mercurialization, even in cases of serious and aggressive heart involvement; it is certainly a much safer drug in complications of this nature, and it is to be preferred where time does not seem to be a very critical factor.

My choice of the form of mercury at this period is the salicylate, given in a suspension of sterile albolene and in a dosage of about 1 grain daily, deeply injected into the muscle. I strongly advise that the injection be made slowly and that the area be gently but persistently massaged until no induration remains. Where this method seems inadvisable, as in excessively thin persons, I next prefer inunctions, using large doses of blue ointment, daily repeated. I have also used the bichloride by mouth and intramuscularly, but with less satisfaction. In any case the dosage should be heavy and should be persisted in until definite signs of mercurialization appear. I then allow a few days to elapse, when salvarsan is given if it has not preceded the use of the mercury, for when salvarsan introduces the treatment in all instances it must be followed by the aggressive use of mercury in some form. Mercury is essential in every case, salvarsan usually of great assistance, and, while salvarsan produces an immediate effect, it has been my experience that alone it does not hold the case as does mercury. This applies equally to chronic or slow as to acute cases.

In the chronic forms of heart complication the manner of treatment differs very little, except that it may not be necessary to confine the patient to bed, especially if mercury is first used. Where the heart is seriously compromised, however, I do not think that salvarsan should ever be employed without keeping the patient in bed and under close observation—a not unwise precaution in any instance. Where mercury is the main drug employed, I strongly advise that at intervals doses of salvarsan be given, to be promptly followed up by resumption of the mercury. Although I have already expressed my preference for the salicylate, given intramuscularly, or for the inunctions, as all therapeutists know, neither of these methods may act well in some individual cases. I have also employed, for example, the proto-iodide with signal success, not occasionally, but very frequently. Similarly, I have used other forms of the drug; in one case the vapors of calomel produced results without toxic symptoms which could not be obtained by any other method used.

Although the iodides are universally admitted to have no direct specific effect in syphilis, in so far as the killing of the organism is concerned, clinical experience has shown their great utility, especially in the long-standing cases of this type. I am not prepared to state how they act, though it is my belief that it is chiefly through promoting absorption of exudate and necrotic tissue, but there can be no question but that they act in a most beneficent way, especially in cardiovascular syphilis. I prefer to employ commonly the familiar salt of potassium, and I use it chiefly after the activity of the process has been checked and either with or subsequent to mercury. There can be no dispute as to its efficiency.

Treatment in every case must be persistently followed out, not only until all signs of advance have disappeared, but long after. Periods of interruption may be allowed only after such a course, lasting not less than eighteen months. In our experience, when treatment is allowed to subside before such a result is reached less and less definite effects follow subsequent treatment, for the heart lesions seem to acquire an immunity against both salvarsan and mercury, so that decisive effects can be no longer attained.

The usual hygienic and mechanical methods of treatment for the circulatory defect are best delayed until the patient has come well under the influence of the antispecific, after which, occasion indicating, they are to be employed, together with the appropriate drugs indicated, digitalis, strophanthus, caffein, epinephrin, and so on. In certain cases these drugs may be quite properly used before the mercury or salvarsan, but in acute cases I think that bad effects are likely to follow under such conditions, although in chronic cases I use them just as one would treat the heart complication, independent of the etiology. It is unnecessary, with the limited space at our disposal, to go further into this question.

The Results of Treatment.—In acute cases placed under treatment before or even soon after decompensation has taken place, prompt and remarkable results are to be confidently expected, commonly within a day or so. Exceptions exist, however, as in one instance reported by Carroll and myself, in which the most energetic combined treatment utterly failed to even check progress.

In long-standing cases in which it is fair to suppose that muscle fibrosis or gumma formation has taken place, and especially if this

has resulted in serious disturbances of rhythm, less benefit is to be expected, though even in such cases more relief will commonly follow the antispecific treatment than will occur after the customary cardiac measures alone. When these two are combined, the result is even then usually startling, but we have been disappointed in seeing, in many of these old cases, an eventual decompensatory period develop over which neither the specific nor the circulatory methods showed effect. In many instances, however, it is very impressive, when the heart has failed to respond to the digitalis group of drugs, to see how promptly it reacts to them when mercury or salvarsan is added.

Two thoroughly treated cases which came to ultimate autopsy from associated lesions have been studied by us, and we have been able to demonstrate completely-healed syphilitic foci in the walls of the heart. In our opinion, complete cure of the specific end of the lesions may be confidently expected in the average case, but it is, of course, impossible to remove adult scar tissue, once it has formed in the heart tissues, or to repair losses of parenchyma from necrosis.

In a certain number of cases a negative Wassermann may follow treatment, and in early cases I believe that this may remain permanently so. In the average case (chronic) the Wassermann becomes weakly positive or conclusively negative during or soon after treatment, but in the greater number of cases eventually returns to positive, although clinical cure may have apparently been attained. A few cases remain Wassermann positive during the entire treatment, yet some of these show great benefit and even clinical cure. I do not regard a negative Wassermann as an essential proof of clinical cure. There are cases which have thus far resisted the most vigorous treatment. One case of syphilis cited to me by Fordyce has had, in addition to thorough mercurial treatment, a total of 20 Gm. of old salvarsan; it is still strongly Wassermann positive, though now free from all clinical signs of the infection.

As a result of our study of this subject, based now on a total of over three hundred cases, we have reached the following conclusions, given as abstracted from the various articles which Dr. Carroll and myself have published:

1. Serious involvement of the heart is a frequent complication of syphilis.

2. Any or all portions of the heart may be involved, but the most constant lesion is of the muscle.
3. Heart complications may develop very early in the infection, or they may appear at any subsequent stage. Symptoms resulting from early lesions may not appear until late.
4. The signs and symptoms are those of cardiac disorder, and little beside history, general aspects, and the Wassermann reaction, may indicate the true etiology.
5. Early cases may be entirely cured, irrespective of the character of the lesion, by vigorous specific treatment alone.
6. Even late and well-established instances usually respond to specific treatment with cure or marked benefit.
7. The most satisfactory treatment is one which combines the use of mercury, salvarsan, and the iodides. The usual circulatory methods are best employed after specific treatment has been established.
8. Successful treatment rests primarily on the recognition of the *cause of the disease*.

CLINICAL SIGNIFICANCE OF VARIATIONS IN THE SYSTOLIC AND DIASTOLIC BLOOD-PRESSES AND THE PULSE-PRESSURE

BY EDWARD E. CORNWALL, M.D.

**Attending Physician to the Williamsburgh and Norwegian Hospitals; Consulting
Physician to the Bethany Hospital, Brooklyn, New York**

UNTIL quite recently examination of the blood-pressure for clinical purposes was limited almost exclusively to observations of the systolic pressure. It is now becoming generally recognized that in order to appreciate the clinical significance of blood-pressure variations it is necessary to study them in the three phases of systolic pressure, diastolic pressure, and pulse-pressure.

In studying these three phases of blood-pressure in their variations we should bear in mind what they mean in terms of the circulation. The systolic pressure is the measure of the force of the ventricular contraction modified by the arterial resistance and less important factors. The diastolic pressure is the lowest pressure between the ventricular contractions, and may be taken as the residual pressure maintained by the tonicity of the arterial system ; it measures the resistance against which the systolic pressure is raised. The pulse-pressure is the difference between the systolic and diastolic pressures.

The first clinical question which arises in connection with the study of these three phases of the blood-pressure is, What is their relation to the efficiency of the circulation ?

The measure of circulatory efficiency is the quantity of blood passing through the tissues in a given time. That depends on a number of factors, chief of which are the quantity and quality of the blood delivered to the heart, the force and frequency of the ventricular contractions, the elasticity of the arteries, and the amount of the peripheral resistance. An exact estimate of the combined, coördinated action of these factors is impossible. A very useful, though only partial, index to the efficiency of the circulation, however, is afforded by the systolic and diastolic pressures considered in their numerical

relations,—that is, the difference between them, which is the pulse-pressure, and the relation of this pulse-pressure to the pressure scale.

The pulse-pressure tells us the fall in pressure between the heart and arterioles, and is analogous to what is termed a "head" of water in hydrostatics. But this "fall," as an index to efficiency of the circulation, is conditioned to a considerable extent by its place in the pressure scale. A given pulse-pressure in one part of the pressure scale may not have the same value as a factor in the circulation as the same pulse-pressure in another part. For example, a pulse-pressure of 40 mm. Hg produced by a systolic blood-pressure of 200 mm. Hg, and a diastolic pressure of 140 mm. Hg will not, naturally, be attended with as efficient a circulation as the same pulse-pressure produced by a systolic pressure of 120 and a diastolic pressure of 80. A theoretic conclusion, which receives practical support, is that there is a particular place in the pressure scale for each individual and each particular condition, where a given pulse-pressure, other things being equal, will produce the fullest circulation and will at the same time be attended with the greatest circulatory flexibility and reserve power; and that pulse-pressures, placed above or below this ideal place in the pressure scale, in order to produce an adequate circulation, must ordinarily increase in magnitude, and that such increase means diminution in the flexibility of the circulation and encroachment on the reserve power of the heart. If the diastolic pressure fails to fall in just correspondence with a falling systolic pressure and thereby permits the pulse-pressure to become unduly small, clinical symptoms of circulatory insufficiency may arise; and if the systolic pressure fails to rise in just correspondence with a rising diastolic pressure and thereby permits the pulse-pressure to become unduly small, the same lessening of circulatory efficiency may be brought about. By the term "just correspondence," used in connection with the rising and falling in reference to each other of the systolic and diastolic pressures, is meant an increase of the pulse-pressure at least adequate to the bare needs of the circulation.

The pacemaker for the pulse-pressure, at least in conditions of disease, seems to be the diastolic pressure more often than the systolic. Movements of the diastolic pressure for any considerable distance in either direction from its normal place in the pressure scale regularly cause the pulse-pressure to increase in size if the circulatory balance

is to be preserved. In cases where the systolic pressure rises while the diastolic falls it is difficult to determine which is chiefly responsible for the increase in the pulse-pressure. This phenomenon is observed with apparently healthy hearts responding to a transient demand, and also sometimes in cases with pathologic conditions which counterbalance each other. A normal pulse-pressure, as well as normal systolic and diastolic pressures, may be observed in cases which show signs and symptoms of cardiac insufficiency.

Before proceeding to discuss the clinical significance of specific variations of the three phases of blood-pressure, it is desirable to state what we consider the normal character of those phases to be, and what their ranges in conditions of apparent health. That we are reluctant to do, because there are no definite standards; blood-pressure conditions in health and disease overlap widely; pressures which are without pathologic significance in some conditions may possess such significance if found in others; and a considerable allowance must always be made for individual peculiarities. Only approximations are possible at the best, and the following figures are offered with the caution that they are subject to many exceptions.

The systolic pressure may range in healthy young adults between 100 and 130, being mostly between 110 and 125. In people of middle age it usually ranges nearly ten points higher, and in elderly people about twenty points higher. In young and middle-aged people a systolic pressure of 140 is often observed without apparently indicating serious disease, at least for a time, and elderly people who appear to be in good health often show a systolic pressure no higher than do young or middle-aged adults. In young adults a systolic pressure below 100 may be considered low, as may one of 110 for a middle-aged person or one of 120 for an elderly person.

The diastolic pressure in young adults may range between 65 and 85, in the middle-aged between 75 and 90, and in the aged between 80 and 100.

The pulse-pressure in health is usually not far from 40, and it may vary between 30 and 50 without necessarily possessing pathologic significance. A pulse-pressure as low as 20 or as high as 60, if persistent, suggests a pathologic condition.

For short periods, as a result of transient functional causes, wide variations of the above figures are observed.

With these few general remarks, we will now proceed to discuss specific variations in the blood-pressure observed in different diseases and morbid conditions. This we can do most conveniently, perhaps, in view of our imperfect knowledge of the subject, if we approach the subject from the side of the diseases themselves.

Chronic nephritis regularly produces changes in the blood-pressure, which, however, other conditions may modify or counteract. The conditions which most often modify the blood-pressure in chronic nephritis are arteriosclerosis, myocarditis, and chronic toxæmia. In some cases one or other of these coexisting conditions may be a more prominent element in the pathologic complex than the nephritis, but in a large and fairly definite group of cases the nephritis is the predominating condition, and in that group the following changes in blood-pressure may be observed.

The diastolic pressure is regularly raised, and the degree of its elevation is roughly proportionate to the severity of the kidney lesion. This seems to be the most characteristic blood-pressure change in chronic nephritis. The diastolic pressure may rise to only 100 in mild cases, but in severe ones it may rise to 120, 140, 160, and even higher. Along with the rise of the diastolic pressure there is regularly a rise of the systolic pressure and increase in the pulse-pressure to meet the changed requirements of the circulation. The systolic pressure may rise to 175, 200, 250, 300, and even higher. In order to maintain this high systolic pressure the left ventricle regularly hypertrophies. When this hypertrophy has reached its limit and myocardial degeneration has developed to a notable degree, so that there is no more reserve power in the heart, the systolic pressure ceases to rise, and as the case progresses it declines. Then there may be some fall in the diastolic pressure, but not enough to produce a pulse-pressure large enough to compensate for the myocardial weakness: the diastolic pressure falls considerably only in the later stages of the disease, when symptoms of cardiac exhaustion have appeared. The pulse-pressure is regularly large while there is circulatory compensation of the kidney insufficiency. It increases more or less in a geometric ratio with the increase in the diastolic pressure, being in mild cases about 60, which is nearly within normal limits, and in severer cases 80, 100, and even more. With a diastolic pressure of 140, a

pulse-pressure adequate to maintain circulatory compensation of the kidney insufficiency will usually be found not far from 100.

In the following cases, cited to illustrate blood-pressure variations in chronic nephritis, the kidney lesion seems to be a prominent or the predominating factor in producing the blood-pressure picture. Nearly all of the blood-pressure records mentioned were taken by the auscultatory method.

CASE 1.—Man, 53; albumin and hyaline and granular casts in urine; heart moderately enlarged, systolic murmur over aortic valve, sounds impure; blood-pressure, 220 systolic, 120 diastolic. Eight months later (patient had a severe attack of erysipelas in the meantime): Blood-pressure, 175 systolic, 120 diastolic; marked signs and pronounced symptoms of myocardial insufficiency present.

CASE 2.—Woman, 39; trace of albumin and granular casts in urine and diminished urea; blood-pressure, 290 systolic, 170 diastolic. During following two months systolic pressure, when observed, was about 300, being twice found 325. She died two months later, beyond the writer's observation. This patient, when first seen by the writer, two years before her death, had a systolic pressure of 290, which came down under treatment to 220.

CASE 3.—Woman, 28; trace of albumin and hyaline and granular casts in urine and diminished urea; blood-pressure, 215 systolic, 145 diastolic. Nine months later, after treatment, blood-pressure was 155 systolic, 110 diastolic; trace of albumin, but no casts, found in urine, and urea normal.

CASE 4.—Woman, 60; seen in mild attack of uræmia; blood-pressure, 200 systolic, 50 diastolic. Improved under treatment, but blood-pressure did not become much lower.

CASE 5.—Woman, 31; had chronic nephritis since birth of child, two years ago; suffers from headache, shortness of breath on exertion, and general weakness; blood-pressure, 240 systolic, 140 diastolic.

CASE 6.—Woman, 59; suffers from dizziness on rising in morning; examination of urine negative; heart sounds impure and faint systolic murmur over aortic valve; blood-pressure, 270 systolic, 120 diastolic.

CASE 7.—Woman, 35; very obese; suffers from shortness of breath on exertion and headaches; trace of albumin, granular casts, and trace of sugar in urine and diminished urea; blood-pressure, 200 systolic, 140 diastolic. Treatment failed to produce much reduction of blood-pressure.

CASE 8.—Man, 43; suffers from vomiting, apparently uræmic; blood-pressure, 275 systolic, 140 diastolic.

CASE 9.—Man, 41; complains of no particular symptoms; blood-pressure, 220 systolic, 115 diastolic. One month later, after treatment, blood-pressure was 170 systolic, 112 diastolic.

CASE 10.—Man, 21; "gets tired easily and often wakes up with a start"; has been told that he has chronic nephritis; albumin and hyaline and granular casts in urine, quantity in 24 hours 6 pints, urea in 24 hours 58 grammes; blood-pressure, 115 systolic, 75 diastolic. Three days later, after treatment, albumin and casts in urine, quantity 4 pints, urea 34 grammes. Ten days later, few casts in urine, but no albumin, quantity 4 pints, urea 26 grammes. Seventeen days

still later, trace of albumin in urine, but no casts, quantity 3 pints, urea 19 grammes. Patient went to Jamaica for winter, and report from there three months later showed no albumin or casts. This seems to have been a case of the so-called azoturic diabetes.

In arteriosclerosis the blood-pressure changes seem to be less regular and uniform, less obstinately persistent, and less definitely characteristic than in chronic nephritis, and they seem to be more susceptible to modification by other conditions than in the latter disease. It is often difficult to disentangle the elements in the blood-pressure picture which are due to the arteriosclerosis from those due to the other conditions. Moreover, the lesions of arteriosclerosis differ widely in their intrinsic influence on the blood-pressure according to their character and distribution: some have very little influence, while others, notably lesions affecting the aorta, the coronary arteries, and the arteries in the brain, may have a great influence. The diastolic pressure in arteriosclerosis may or may not be raised. It is usually raised when the arterial supply of vital regions is involved, but the elevation does not seem to be so high, as a rule, as in chronic nephritis. The systolic pressure may be raised to produce an adequate pulse-pressure. When myocarditis complicates, the enlargement of the pulse-pressure seems often in part to be produced by lowering of the diastolic pressure, thus securing a relief which does not seem to be available in advanced chronic nephritis.

In the following cases, cited to illustrate blood-pressure variations in arteriosclerosis, the arterial lesions seem to be a prominent or the predominating factor in producing the blood-pressure picture:

CASE 1.—Woman, 75; suffers from shortness of breath on exertion and general weakness; left ventricle of heart slightly enlarged, systolic murmur over aortic valve transmitted upwards, late systolic murmur at apex; examination of urine negative; blood-pressure, 175 systolic, 100 diastolic.

CASE 2.—Man, 50; suffers from shortness of breath on exertion, vertigo, palpitation, and insomnia, heart slightly dilated, faint systolic murmur in aortic region, pulse becomes slower by 15 to 20 beats on going upstairs; blood-pressure, 100 systolic, 80 diastolic. Four weeks later, after treatment, blood-pressure was 115 systolic, 80 diastolic, showing an increase in the pulse-pressure of from 20 to 35. In this case myocarditis is evidently a prominent complication.

CASE 3.—Woman, 62; suffers from shortness of breath on exertion and a tendency to deflect to the right when walking; examination of urine negative; blood-pressure, 160 systolic, 70 diastolic.

CASE 4.—Man, 66; suffers from dizziness and shortness of breath on exertion; trace of albumin and hyaline casts in urine; blood-pressure, 180 systolic, 120

diastolic. A few months later, after treatment, patient felt well, and blood-pressure was 175 systolic, 95 diastolic.

CASE 5.—Man, 65; suffers from a sense of whirling in head, which is brought on by turning head when lying down; blood-pressure, 130 systolic, 85 diastolic.

CASE 6.—Woman, 56; suffers from indigestion and shortness of breath on exertion; examination of urine negative; heart slightly enlarged, systolic murmur over aortic area; blood-pressure, 175 systolic, 80 diastolic.

CASE 7.—Woman, 65; suffers from shortness of breath on exertion, staggering gait, sensation of numbness in certain parts of body, and "nervousness"; examination of urine negative; heart slightly enlarged, second aortic sound accentuated and roughened; blood-pressure, 245 systolic, 145 diastolic. While under observation for two months blood-pressure fluctuated between figures given above and 175 systolic, 80 diastolic.

CASE 8.—Man, 48; suffers from shortness of breath on exertion; examination of urine negative; heart slightly enlarged, sounds impure; blood-pressure, 180 systolic, 105 diastolic. Two weeks later, after treatment, blood-pressure was 115 systolic, 65 diastolic. Four weeks still later, blood-pressure was 135 systolic, 80 diastolic.

CASE 9.—Man, 64; suffers from shortness of breath on exertion; heart slightly enlarged, systolic murmur over aortic region and apex; examination of urine negative; blood-pressure, 120 systolic, 60 diastolic.

CASE 10.—Man, 63; suffers from "nervousness" and occasional shortness of breath on exertion; faint systolic murmur over aortic region; signs of moderate gastrocoloptosis; 3 per cent. of sugar in urine, but no albumin or casts found; blood-pressure, 140 systolic, 80 diastolic. Several weeks later, after treatment, sugar in urine was 1 per cent. and blood-pressure about the same as before.

CASE 11.—Woman, 60; trace of albumin and hyaline and granular casts in urine and diminished urea, also 6.5 per cent. of sugar; blood-pressure, 220 systolic, 115 diastolic. One month later, after treatment, trace of albumin and hyaline casts found in urine, urea normal, sugar reduced to a faint trace; blood-pressure was 165 systolic, 70 diastolic.

CASE 12.—Man, 64; suffers from shortness of breath on exertion; heart sounds impure and action irregular; blood-pressure, 180 systolic, 115 diastolic. After treatment, symptoms improved and blood-pressure was 165 systolic, 95 diastolic.

CASE 13.—Man, 52; suffers from arthritis in small joints of hands and cardiac irritability; heart slightly enlarged, faint systolic murmur over aortic region and apex; examination of urine negative; blood-pressure, 140 systolic, 80 diastolic.

CASE 14.—Woman, 41; suffers from occasional dyspnoea on exertion and "nervousness"; examination of urine negative; systolic murmur over aortic region and at apex, heart not appreciably enlarged; blood-pressure, 175 systolic, 55 diastolic. Two weeks later, after treatment, blood-pressure was 150 systolic, 80 diastolic.

CASE 15.—Man, 55; suffers from intense vertigo when lying on his left side and when turning his head to the left, which developed suddenly; heart sounds roughened; examination of urine negative; blood-pressure, 170 systolic, 95 diastolic. After treatment symptoms improved and blood-pressure lessened, fluctuating between 170 systolic, 95 diastolic, and 125 systolic, 70 diastolic, being most of the time about 150 systolic, 80 diastolic. The dizziness was reduced to an occasional occurrence and was elicited by a different motion, viz., by tipping the head backward.

In *chronic myocarditis*, or any condition of myocardial weakness, the systolic pressure shows a tendency to fall below the ideal for co-existing conditions, and the diastolic pressure to accommodate itself to the systolic pressure when it can, and the pulse-pressure to enlarge. In uncomplicated myocarditis both systolic and diastolic pressures may be below normal and the pulse-pressure larger than normal. The effects of myocarditis may not be strongly evident on the blood-pressure for a considerable time, being apparently spent on the reserve power of the heart; when that is exhausted, then the natural effects may appear.

In the following cases, cited to illustrate blood-pressure variations in chronic myocarditis and condition of myocardial weakness, the myocardial lesion seems to be the predominating or a prominent factor in producing the blood-pressure picture:

CASE 1.—Man, 83; signs of senile heart; one or two per cent. of sugar usually found in urine; blood-pressure, 165 systolic, 75 diastolic.

CASE 2.—Man, 54; no special symptoms; examination of urine negative; immediately on coming into examining room, blood-pressure, 180 systolic, 105 diastolic. One hour later, after sitting quietly, blood-pressure was 120 systolic, 80 diastolic.

CASE 3.—Woman, 55; suffers from dyspnoea and sense of choking when she lies down; trace of albumin and hyaline casts in urine; heart sounds roughened; blood-pressure, 200 systolic, 120 diastolic. Six weeks later, after treatment, blood-pressure was 160 systolic, 90 diastolic.

CASE 4.—Man, 76; suffers from slight cough and shortness of breath on exertion; blood-pressure, 165 systolic, 75 diastolic.

CASE 5.—Man, 50; suffers from dizziness, fulness in head, and insomnia; heart sounds impure and very feeble; blood-pressure, 95 systolic, 65 diastolic. After treatment symptoms improved, and systolic pressure was reported to have risen to 120.

CASE 6.—Man, 60; suffers from shortness of breath on exertion; heart slightly dilated, sounds feeble and impure, and radial arteries extremely atheromatous; reported to have had glycosuria of moderate degree for at least several months; blood-pressure, 120 systolic, 45 diastolic.

Chronic toxæmia of intestinal origin appears to be a factor of considerable importance in producing variations in the blood-pressure, and its effects seem to differ greatly according to what other conditions are present. With chronic nephritis and possibly with arteriosclerosis it seems capable of raising still higher the systolic pressure, and even the diastolic, also, in some cases; but in cases in which those conditions are absent, or not present in marked degree, it seems more

regularly to lower both systolic and diastolic pressures, and in some cases the systolic more than the diastolic, thereby diminishing the pulse-pressure. There seems to be a marked variability in its action. The part played by this toxæmia in any given blood-pressure picture can be estimated approximately by means of the therapeutic test. If we diminish the amount of toxæmia by dietetic treatment, the resulting alterations in the blood-pressure picture may show by subtraction the effect on the blood-pressure of the toxæmia in the given case.

In the following cases, cited to illustrate blood-pressure variations in chronic toxæmia of intestinal origin, the toxæmia seems to be the predominating, or a prominent, factor in producing the blood-pressure picture:

CASE 1.—Man, 30; has "poker spine" from previous arthritis deformans; suffers from dizziness, intestinal flatulence, and constipation; trace of albumin and hyaline casts in urine; blood-pressure, 90 systolic, 70 diastolic. After treatment symptoms improved and blood-pressure was 100 systolic, 65 diastolic.

CASE 2.—Man, 39; suffers from bad taste in mouth, some general weakness, headaches, and, since early childhood, frequent attacks, on lying down, of what he calls "trances," from which he can be roused by a touch, and from which he emerges by himself after about five minutes; examination of urine negative; blood-pressure, 98 systolic, 50 diastolic. After treatment symptoms improved and "trances" occurred less frequently, and the blood-pressure became slightly higher.

CASE 3.—Man, 46; suffers from frequent asthmatic attacks and constipation, with occasional passage of mucus from bowel; heart slightly enlarged, sounds soft but not impure; liver slightly enlarged; few whistling râles over lungs on expiration; blood-pressure, 95 systolic, 75 diastolic.

CASE 4.—Man, 29; suffers from constipation, with occasional passage of mucus from bowel; blood-pressure, 95 systolic, 60 diastolic.

CASE 5.—Man, 59; suffers from frequent and severe headaches, constipation, intestinal flatulence, and occasional passage of mucus from bowel; blood-pressure, 200 systolic, 100 diastolic. One week later, after treatment, blood-pressure was 140 systolic, 75 diastolic.

CASE 6.—Man, 55; suffers from headaches and constipation; examination of urine negative; blood-pressure, 100 systolic, 60 diastolic. After treatment symptoms greatly improved and blood-pressure ranged about 125 systolic, 75 diastolic.

CASE 7.—Man, 46; has had chronic colitis for many years, and was operated on for chronic appendicitis five years ago; blood-pressure, 90 systolic, 60 diastolic.

CASE 8.—Man, 20; suffered for two years from convulsive attacks closely resembling epilepsy, which lately increased in frequency, occurring several times a month, and also from constipation for many years; liver moderately enlarged; signs of moderate ptosis of right side of transverse colon and of enlargement of cæcum and ascending colon; examination of urine negative; blood-pressure, 125 systolic, 55 diastolic. After treatment epileptiform attacks promptly disappeared and blood-pressure ranged around 105 systolic, 55 diastolic.

CASE 9.—Man, 50; suffers from periodical attacks of intense headache, bron-

chial irritation, and palpitation of the heart; urine negative; systolic blood-pressure between the paroxysms ordinarily between 130 and 150 and during a paroxysm was found to be 170. While in a paroxysm, nitroglycerin, gr. $\frac{1}{10}$, given under the tongue, caused great increase in the symptoms and such a fall in the blood-pressure that the patient fainted; the blood-pressure was so low that it could not be estimated, and the pulse-rate was 36.

Chronic tobacco poisoning seems to be a cause of low blood-pressure, both systolic and diastolic. In cases showing cardiac symptoms the writer has observed that the diastolic pressure was not lowered in just correspondence with the systolic, resulting in an insufficient pulse-pressure.

In the following cases, cited to illustrate blood-pressure variations in chronic tobacco poisoning, the tobacco toxæmia seems to be the predominating factor in producing the blood-pressure picture:

CASE 1.—Man, 36; heavy smoker for many years; has mild anginoid symptoms and some shortness of breath after more than usually heavy smoking and severe physical exercise; heart slightly enlarged, sounds soft but clear, and action slightly irregular in force and rhythm; blood-pressure, 115 systolic, 65 diastolic. A single smoke caused the diastolic pressure to rise ten points, but did not affect the systolic pressure. During two months' observation the systolic pressure in this case ranged between 115 and 85, the diastolic pressure between 60 and 75, and the pulse-pressure between 55 and 20, being most of the time between 30 and 40. A pulse-pressure of 20 was observed when the systolic pressure was at 85, at which time the anginoid symptoms were more than usually pronounced. Leasened indulgence in tobacco was followed by improvement in all the symptoms, and after six months the blood-pressure was 125 systolic, 65 diastolic. An exercise test caused both systolic and diastolic pressures to drop 10 points.

CASE 2.—Man, 37; smokes very little because of an idiosyncrasy to tobacco; even moderate indulgence produces mild anginoid symptoms; blood-pressure, 100 systolic, 55 diastolic. After smoking half a cigar the systolic pressure was unchanged, but the diastolic pressure was 10 points higher. The same exercise test as in the preceding case caused the systolic pressure to rise 15 points, while the diastolic pressure remained unchanged.

CASE 3.—Man, 42; excessive smoker of cigarettes for many years; no cardiac symptoms; blood-pressure, 105 systolic, 55 diastolic. A single smoke caused a rise of 15 points in both systolic and diastolic pressures. The same exercise test as in the two preceding cases caused both systolic and diastolic pressures to rise 5 points.

The above three cases, viz., the excessive smoker who had anginoid symptoms, the moderate smoker with the unusual susceptibility to tobacco who had anginoid symptoms, and the excessive smoker who did not have anginoid symptoms, all agreed in showing low systolic and diastolic pressures. In both those showing anginoid symptoms the pulse-pressure was made smaller by a single smoke, but this did

not happen in the case without anginoid symptoms. In the case of the excessive smoker with anginoid symptoms the exercise test lowered both systolic and diastolic pressures. In the other two cases it raised the systolic pressure and either did not affect at all or slightly raised the diastolic pressure.

In *lobar pneumonia* the blood-pressure in the systemic circulation does not seem to be disturbed regularly to a notable degree. There may be some lowering of the systolic and diastolic pressures at the beginning of the disease and again at the time of the crisis and for a few days after, but in general the pressures keep near the normal for the individual. They are, however, usually lowered when there is myocarditis, pericarditis, myocardial failure from exhaustion, or severe toxæmia. In thirty-two cases of lobar pneumonia seen by the writer in 1913 in which blood-pressure examinations were made more or less systematically results were obtained which contradicted the assertion of Gibson and Hare, that in cases of pneumonia in which the systolic pressure falls below the pulse-rate the prognosis is bad; in 29 of these 32 cases, all but two of which recovered, the systolic pressure fell below the pulse-rate. In most of these cases the minimal systolic pressure observed was between 90 and 110, and the minimal diastolic between 60 and 70. A diastolic pressure as low as 40 was observed in a case which recovered. In one of the cases which died the blood-pressure was observed to be 70 systolic and 50 diastolic 21 hours before death; and in the other it was observed to be 95 systolic and 70 diastolic 36 hours before death. In several cases of pneumonia which terminated fatally the writer has seen, shortly before death, a sudden and considerable rise in the systolic pressure. This phenomenon was probably due to partial asphyxiation.

In *typhoid fever* the writer has found the systolic pressure usually in the neighborhood of 100, with a pulse-pressure between 30 and 40. In some cases with signs of myocarditis the systolic pressure has been higher and the pulse-pressure larger.

In *influenza*, *diphtheria*, and *rheumatic fever* the blood-pressure seems usually to be low. A case diagnosed as intestinal grip, in a man of 46, seen first by the writer when the patient was walking around in early convalescence, showed blood-pressure of 90 systolic and 50 diastolic. The patient felt weak, but otherwise comfortable. A week later the blood-pressure was 87 systolic and 50 diastolic.

Three days still later, after rest in bed, the blood-pressure was 105 systolic and 60 diastolic.

In *chronic pulmonary tuberculosis* and *chronic wasting diseases* the blood-pressure is apt to be low, though considerable variation may be observed, particularly in tuberclosis. A man of 42, who suffered for more than a year with general debility, whose liver was much and spleen slightly enlarged, whose haemoglobin was 65 per cent., whose erythrocytes were 3,216,000 and leucocytes 447,000, with 40 per cent myelocytes, showed a blood-pressure of 85 systolic and 55 diastolic.

In *chronic valvular disease of the heart* with good compensation the blood-pressure is usually not much disturbed except in the case of aortic incompetence, in which condition there is regularly a large pulse-pressure. With lost compensation in chronic valvular disease both systolic and diastolic pressures are regularly lowered. An extreme instance of low blood-pressure in such a condition was observed by the writer in a boy of 11: his blood-pressure was 65 systolic and 35 diastolic, and the systolic pressure was not found above 70 during a period of four weeks following, after which it began to rise with partial recovery of compensation.

The effect of *surgical shock* on blood-pressure seems to be to lower it. The two following cases illustrate this effect:

CASE 1.—Man, 42; was operated on twice for tumor of the brain, with an interval of five days between the operations. Shortly before anaesthetic (ether) for first operation was begun, blood-pressure was 150 systolic, 90 diastolic. Immediately after first incision of scalp and consequent hemorrhage, systolic pressure was 65 and diastolic pressure could not be estimated. Five minutes later systolic pressure was 85, and 25 minutes still later blood-pressure was 125 systolic, 75 diastolic. The systolic pressure thereafter was found between 100 and 125 until the close of the operation, and fell to 60 as the patient emerged from the anaesthetic, at which low point it was found five hours later; soon after that it rose to 120. Shortly after the anaesthetic for the second operation was begun blood-pressure was 145 systolic, 95 diastolic. During the first stage of the anaesthesia the systolic pressure rose to 170. Immediately after the first incision it fell to 60. During the remainder of the operation, which lasted one and a half hours, the systolic pressure was not found above 60, and for three-quarters of an hour it was not found above 50, being some of the time so low that it could not be estimated by the sphygmomanometer. At the close of the operation it rose to 60. The patient remained in a state of shock for about seven hours, and then died.

CASE 2.—Woman, 53; was operated on for carcinoma uteri (complete hysterectomy). Shortly after complete anaesthesia the blood-pressure was 80 systolic, 60 diastolic. Fifteen minutes later, when abdomen was opened, blood-pressure was the same. Ten minutes still later blood-pressure was 62 systolic, 40 diastolic. Ten

minutes still later blood-pressure was 90 systolic, 75 diastolic. Ten minutes still later blood-pressure was 75 systolic, 60 diastolic. Forty minutes still later blood-pressure was 75 systolic, 60 diastolic. Fifty minutes still later blood-pressure was 85 systolic, 70 diastolic. Ninety minutes still later blood-pressure was 80 systolic, 65 diastolic. Fourteen hours still later blood-pressure was 135 systolic, 70 diastolic, and patient was in fair condition.

The effect of *ether anaesthesia* on the blood-pressure of patients in good general health who are operated on for local conditions seems to be to raise it. In ten such cases, whose blood-pressure variations were observed under the writer's direction, it was found that with the giving of the anaesthetic occurred a rise of 10 to 20 points in the systolic pressure, without much change in the diastolic pressure, and that this rise persisted for about four days.

The effect of *exercise* on the blood-pressure varies much in different pathologic conditions. Advantage has been taken of these variations in devising tests for myocardial efficiency. Tests based on these variations, however, lack conclusiveness, because it is impossible to prevent other factors which regularly or occasionally modify the blood-pressure from obscuring more or less the results. These tests, however, possess, in some cases at least, a certain amount of value, especially when taken in connection with other phenomena. In the following cases illustrations are given of the effect on the blood-pressure, and also on the pulse-rate, of a standard exercise. This standard exercise consisted in running around a room briskly for 30 seconds. Among these illustrative cases are included for comparison some of apparently healthy subjects.

CASE 1.—Man, 24; apparently healthy, except for psoriasis; rather heavy smoker; blood-pressure, 95 systolic, 70 diastolic; pulse-rate, 68. Exercise test: Blood-pressure, 120 systolic, 70 diastolic; pulse-rate, 100. Three minutes later: Blood-pressure, 105 systolic, 70 diastolic; pulse-rate, 68.

CASE 2.—Man, 22; apparently healthy, moderate smoker; blood-pressure, 130 systolic, 70 diastolic; pulse-rate, 64. Exercise test: Blood-pressure, 175 systolic, 40 diastolic; pulse-rate, 80. Five minutes later: Blood-pressure, 130 systolic, 70 diastolic.

CASE 3.—Man, 25; apparently healthy; blood-pressure, 135 systolic, 85 diastolic; pulse-rate, 72. Exercise test: Blood-pressure, 175 systolic, 65 diastolic; pulse-rate, 136. Three minutes later: Blood-pressure, 135 systolic, 85 diastolic; pulse-rate, 84. The same patient next day with exercise test: Blood-pressure, 150 systolic, 75 diastolic; pulse-rate, 130. Two minutes later: Blood-pressure, 135 systolic, 85 diastolic; pulse-rate, 68.

CASE 4.—Woman, 30; apparently healthy; blood-pressure, 120 systolic, 70 diastolic. Exercise test: Blood-pressure, 140 systolic, 55 diastolic. Five minutes

later (sitting) : Blood-pressure, 120 systolic, 70 diastolic. One minute still later (standing) : Blood-pressure, 130 systolic, 90 diastolic.

CASE 5.—Woman, 24; recovered from influenza a week ago; tires easily; blood-pressure, 105 systolic, 65 diastolic; pulse-rate, 72. Exercise test: Blood-pressure, 120 systolic, 70 diastolic; pulse-rate, 120. Two minutes later: Blood-pressure, 105 systolic, 80 diastolic; pulse-rate, 84.

CASE 6.—Man, 53; heart slightly enlarged, sounds soft and impure; blood-pressure, 120 systolic, 75 diastolic; pulse-rate, 100. Exercise test: Blood-pressure, 135 systolic, 80 diastolic; pulse-rate, 88. Three minutes later: Blood-pressure, 120 systolic, 75 diastolic; pulse-rate, 100.

CASE 7.—Man, 36; obese, otherwise apparently healthy: blood-pressure, 165 systolic, 95 diastolic; pulse-rate, 68. Exercise test: Blood-pressure, 180 systolic, 100 diastolic; pulse-rate, 80. After five minutes: Blood-pressure, 165 systolic, 100 diastolic; pulse-rate, 68.

CASE 8.—Woman, 56; heart slightly enlarged, sounds impure; has occasional attacks of shortness of breath and oppression in precordium; blood-pressure, 105 systolic, 75 diastolic; pulse-rate, 100. Exercise test: Blood-pressure, 110 systolic, 80 diastolic; pulse-rate, 100. After three minutes: Blood-pressure, 95 systolic, 75 diastolic; pulse-rate, 120. After five minutes: Blood-pressure, 105 systolic, 75 diastolic; pulse-rate, 100.

CASE 9.—Man, 50; suffers from attacks of oppression in chest, with pains in both arms; heart slightly enlarged, sounds impure; blood-pressure, 100 systolic, 75 diastolic. Exercise test: Blood-pressure, 100 systolic, 65 diastolic; pulse-rate, 100. After three minutes: Blood-pressure, 100 systolic, 75 diastolic; pulse-rate, 88.

CASE 10.—Man, 48; heavy smoker; left ventricle of heart enlarged downward and to left $\frac{1}{4}$ inch; sounds impure; blood-pressure, 120 systolic, 60 diastolic; pulse-rate, 80. Exercise test: Blood-pressure, 125 systolic, 65 diastolic; pulse-rate, 70. After four minutes: Blood-pressure, 85 systolic, 48 diastolic; pulse-rate, 70. After six minutes: Blood-pressure, 105 systolic, 80 diastolic; pulse-rate, 78. After ten minutes: Blood-pressure, 105 systolic, 70 diastolic; pulse-rate, 78.

CASE 11.—Man, 50; albumin and hyaline and granular casts in urine; left ventricle of heart enlarged, systolic murmur over aortic region, heart sounds equal at apex and impure; blood-pressure, 210 systolic, 120 diastolic; pulse-rate, 120. Exercise test: Blood-pressure, 220 systolic, 120 diastolic; pulse-rate, 160. After three minutes: Blood-pressure, 200 systolic, 120 diastolic; pulse-rate, 128.

CASE 12.—Man, 43; excessive user of tobacco and coffee; physical examination negative; blood-pressure, 148 systolic, 90 diastolic; pulse-rate, 68. Exercise test: Blood-pressure, 160 systolic, 85 diastolic; pulse-rate, 68. After three minutes: Blood-pressure, 135 systolic, 85 diastolic; pulse-rate, 68. This patient stopped taking coffee and tobacco, and regulated his diet; blood-pressure was 122 systolic, 72 diastolic.

From such illustrations of the effect of exercise on the blood-pressure in health and different pathologic conditions as those given above, it is not possible to make definite inferences regarding myocardial efficiency. These illustrations, however, are suggestive. They suggest that in health exercise causes an increase of pulse-pressure by raising the systolic and lowering the diastolic pressure, and that

the pressure conditions return to the normal very soon after cessation of the exercise. They also suggest that in cases with myocardial degeneration or weakness from any cause the changes in the blood-pressure caused by exercise may not always be pronounced, that the systolic pressure may rise but slightly or even fall after a short rise, that the diastolic pressure may be sluggish and may rise instead of falling, that the pulse-pressure may be only slightly enlarged, or may even become smaller than before, and that the pressure conditions, after cessation of the exercise, may return to the normal more slowly than in health. They also suggest that in chronic tobacco poisoning exercise may produce blood-pressure changes which show a similarity to those found in conditions in which signs of actual myocardial degeneration are present. We may conclude that, while a myocardial efficiency test based on blood-pressure changes observed after a standard exercise may not have pathognomonic significance, these variations, carefully studied in connection with other signs and symptoms, seem to possess corroborative value and are deserving of attention.

The effect of *therapeutic procedures* on abnormal blood-pressure must be interpreted in the light of several facts, notably the following: that elevation of the blood-pressure, both systolic and diastolic, as well as increase of the pulse-pressure, is usually and chiefly compensatory; that lowering of the blood-pressure, both systolic and diastolic, as well as diminution of the pulse-pressure, is more regularly symptomatic; and that "nervous" factors may enter to an appreciable extent into the causation of most cases of abnormal pressure, and that in some they constitute apparently the entire causation.

Therapeutic procedures to correct abnormally high blood-pressure, in order to be rational, should be directed as far as possible to removing the causes of the abnormal pressure, and only in exceptional cases should the treatment of high blood-pressure be symptomatic, viz., when continuance of the existing high pressure threatens accidents to the cardiovascular apparatus. In the treatment of abnormally low blood-pressure removal of the causes as far as possible should be attempted, and also, more generally than in high pressure, symptomatic treatment may be given.

There is one therapeutic procedure which is of value in the differential diagnosis of conditions producing high blood-pressure. This is the use of a non-putrefactive diet, which removes, in part at least, one of the causes, direct or indirect, of high pressure, viz., the ab-

sorption from the alimentary tract of the poisonous products of the activity of the putrefactive bacteria. This diet also diminishes the amount of free purins ingested. When in a case of persistent high pressure the non-putrefactive diet is given and the tension returns nearly to the normal, we can, as a rule, exclude any considerable degree of chronic nephritis or arteriosclerosis. When the use of this diet, though followed by improvement in other symptoms, fails to bring about much reduction in the blood-pressure, we may strongly suspect the presence of well-advanced chronic nephritis or sclerosis of arteries supplying vitally important regions of the body, with the probability that it is the former. When the use of this diet brings about a notable reduction of the blood-pressure, but leaves it still considerably above the normal, we may suspect arteriosclerosis or an early stage of chronic nephritis.

Besides the non-putrefactive diet, in the administration of which care should be taken to secure adequate nutrition, the most valuable therapeutic procedures for the reduction of persistent high blood-pressure are rest of mind and body and warmth. Exercise and a change of occupation may sometimes prove advantageous. The use of drugs to lower the blood-pressure is allowable when accidents to the cardiovascular apparatus are threatened. Phlebotomy is an emergency procedure of great value in some cases where there are increased venous pressure and a very weak heart. The nitroglycerin test is useful in determining whether particular symptoms are due to arteriosclerosis or toxæmia.

Many of the heart stimulant drugs in good and general use do not seem to raise the blood-pressure; but, even when they do not produce an elevation of the systolic pressure, they often appear clinically to improve the circulation, suggesting that the efficiency of the circulation,—that is, the movement of the whole volume of blood,—does not depend altogether on the blood-pressure conditions. It is conceivable that a drug which lowers the blood-pressure may improve the circulation by lowering the diastolic pressure more than the systolic, thereby increasing the pulse-pressure. Such may be the case with nitroglycerin.

The clinical significance of variations in the systolic and diastolic blood-pressures and the pulse-pressure is a particularly difficult subject to deal with, both in its entirety and in its parts, not only because it is comparatively new and has not been thoroughly studied, but be-

cause of intrinsic difficulties. The possibilities of error in observation and of confusion of data are present in an unusual degree. The preceding discussion of this subject, which is based largely on the writer's personal observations, is intended to be only cursory and suggestive, and not conclusive or dogmatic, and the following statements, which are based on the preceding discussion, are offered for what they may be worth:

1. A low systolic pressure, provided the diastolic pressure is sufficiently low to provide an adequate pulse-pressure, does not necessarily mean poor circulation, though it does seem to imply a diminished reserve power of the heart.
2. A comparatively low systolic pressure with a comparatively high diastolic pressure and a consequently small pulse-pressure may mean myocardial weakness with chronic nephritis, arteriosclerosis, chronic toxæmia, or arterial spasm.
3. A low diastolic pressure with a comparatively high systolic pressure and an excessively large pulse-pressure may mean several things; e.g., a purely functional condition, a compensated aortic regurgitation, myocardial degeneration without much arteriosclerosis or chronic nephritis, or vasodilatation from any cause.
4. The diastolic pressure seems to be more stable than the systolic, and to show less often than the systolic marked variations from its normal without definite pathologic cause; and the systolic pressure seems to accommodate itself to the diastolic more easily than the diastolic to the systolic in conditions of disease. The diastolic pressure seems to indicate the peripheral resistance, which in many cases is determined by definite pathologic conditions. Movements of the diastolic pressure beyond the normal range seem to be a sufficient cause for enlargement of the pulse-pressure if an adequate circulation is to be kept up.
5. Heart stimulant drugs seem to improve the circulation in some cases, even when they do not raise the systolic pressure.
6. It is possible that vasodilator drugs may improve the circulation by increasing the pulse-pressure.
7. Cardiac depressant drugs may lower the diastolic pressure by diminishing the systolic force and thereby calling for an enlargement of the pulse-pressure.
8. A systolic pressure of 100 or lower in an adult, if persistent, may call for treatment.

9. A diastolic pressure of 100 or higher, if persistent, suggests disease.
10. It may be possible for a patient to live for several hours with a systolic pressure as low as 60, for several days with one of 70, and to walk around without particular symptoms of circulatory distress with one of 90, provided the pulse-pressure is sufficiently large.
11. A pulse-pressure as small as 20 or as large as 60, if persistent, may be pathologic.
12. A systolic pressure persistently over 140 in a young or middle-aged adult suggests disease.
13. A fall in the systolic pressure in response to an exercise test, immediately or after a short preliminary rise, and a delay in its return to the normal, and also at the same time a failure of the pulse-pressure to show a substantial increase in size, suggest myocardial weakness.
14. Shortly before death partial asphyxiation may cause a sudden, transient rise in the blood-pressure.
15. Toxemias, both acute and chronic, may lower the systolic pressure without much increase or with some diminution in the pulse-pressure.
16. In some cases with high blood-pressure, lowering of the pressure follows the taking of a non-putrefactive diet, and the amount of the lowering seems inversely to correspond more or less with the degree of development of coexisting chronic nephritis or arteriosclerosis.
17. Chronic tobacco poisoning seems often to be attended with low blood-pressure.
18. Chronic nephritis seems regularly to be attended with a high diastolic pressure and a large pulse-pressure, which is adequate so long as the myocardial reserve power holds out.
19. Arteriosclerosis, as a rule, seems to produce marked elevation of the blood-pressure only when the blood supply of a vital region is disturbed or when the aorta is affected.
20. The neurotic factor in the patient and the personal factor in the observer may require a considerable allowance to be made for them in the interpretation of blood-pressure findings; and it is necessary to be constantly on guard against being misled by blood-pressure findings, and especially against ascribing too much importance to them when unsupported by other evidences of disease.

Surgery

A VISIT TO THE SURGICAL CLINIC OF JOHN B. MURPHY AT THE MERCY HOSPITAL IN CHICAGO

BY P. G. SKILLERN, Jr., M.D.

Philadelphia

It is the ambition of every surgeon in his study travels to visit the clinic of that great and peerless teacher, originator, and investigator, Dr. John B. Murphy. If the pilgrim has been inspired by reading Dr. Murphy's published "Clinics," it proves a source of much gratification to him to discover that Dr. Murphy talks just as he writes, and that all that appears in the volumes is demonstrated and discussed at the operating table.

The Mercy Hospital is a handsome brick building, situated at Twenty-sixth Street and Prairie Avenue, and of the most modern type. After a walk through a long corridor one descends the steps to the operating room, which may be reached more directly by the entrance at Twenty-sixth Street and Calumet Avenue. The reporter was gowned and directed to a stool in the pit of the theatre, whence a view of each operation was afforded at very close range.

The theatre accommodates five hundred spectators, the daily attendance averaging about one-third that number. A unique feature is that every day as many as thirty-five States in the Union are represented, as well as Canada and foreign countries. The seats face the large pit and the ample windows, which admit light from the north. The lower windows are of glazed glass, upon which are written the list of operations and statistical tables for the day. One hour previous to Dr. Murphy's arrival his assistants have been busy hanging up the charts, tables, etc., appropriate to the cases of the day. These charts are renewed as each case comes in.

Dr. Murphy's teaching methods are of great interest. He is a firm believer in the efficiency of ocular demonstrations. Not only are

there numerous charts, but he has also a large collection of bones, normal and pathologic, with which he illustrates his comments made during the course of bone operations. There are also within reach a large number of photographs and skiagrams. For example, when performing an arthroplasty of the knee-joint he relates case after case from his great experience, illustrating the various phases that come into question. Dr. Murphy talks in a clear-cut and forceful manner. First the history of the case is read by the interne, who is interrupted by interrogations when the anamnesis is not clear. Dr. Murphy then discusses the case, its pathology, and particularly the diagnosis, while preparations for operation are being made, continuing the discussion during the operation and upon its conclusion summing up all the points. The medical aspect of border-line cases is discussed by Dr. Mix.

Dr. Murphy enters the pit shortly after nine o'clock, and finishes the sterilization of his hands. He then puts on elbow-length fabric gauntlets, over which are drawn dry rubber gloves. The operating table is wheeled in bearing the patient, to whom ether is being administered by the Sister Ethelreda. A small mask is used and the ether dropped on from its original container, regulation of the flow being obtained by a gauze wick held in place by the cork stopper. A large tank of oxygen is wheeled in by the Sister's side, ready for use. A rubber cork tunnelled mouth-gag is used when necessary, holding the jaws apart and at the same time permitting the patient to breathe through it. The table is placed in the most advantageous position for the spectators. The skin is prepared with iodine, and a perforated sheet, bearing four towels secured around the opening, is laid upon the patient. Dr. Murphy begins the incision with his razor-scalpel, which makes a very clean wound, with surprisingly little hemorrhage. The operation proceeds deliberately and smoothly. A stenographer, seated on the front row, takes down Dr. Murphy's comments. Such details as "swatting" the occasional flies are carried out by an attendant. Ample illumination is afforded by a cluster of Mazda lamps in a holophane shade, which is suspended from an arm of heavy brass tubing attached to the wall in such a manner that it may be pushed in and out and swung from side to side. In addition to this, Dr. Murphy wears an electric lamp suspended from his forehead by a metallic head-band.

There are three assistants: one responsible for the instruments,



J. G. Murphy

another for the retractors, the third for the gauze sponges. The latter are in the form of a long, broad tape, to each of which a haemostat is attached. When soiled, the sponge is thrown upon the floor with the haemostat still on, thus minimizing the chances of its floating out of sight. To each abdominal pad is sewn a long tape, at the end of which is a haemostat, so that the pad can never disappear entirely within the abdomen. Dr. Murphy operates in a dry field, using dry sponges and dry hands.

FIRST DAY

The first case presented bilateral pyosalpingitis of thirteen years' duration. In delivering the distended tubes Dr. Murphy pointed out the importance of working from behind forward and outward, opposite the direction in which the diseased tubes gradually settled themselves, spoke of the late Dr. Joseph Price, of Philadelphia, as having suggested this safer method of delivery, and referred to an operator whom he had seen begin the separation of the tubes from in front, with disastrous results to the pelvic viscera. He then spoke of the innocuousness of the contents of a pyosalpinx, and discussed the effects of various infections upon the tubes. He clasped his fingers in illustration of the relations presented by the mucous folds of the oviduct when infiltrated and edematous from an infection. In the staphylococcal and streptococcal types the superficial layers only are involved, but as the inflammation subsides the finger-like processes retract from each other, the patency of the tube is restored and drainage into the uterus resumed; but if the fimbriated extremity remain sealed, preventing leakage of the normal mucous secretion into the peritoneal cavity, a hydrosalpinx may result. Gonococcal invasion, on the other hand, involves the submucous layers, the epithelium is destroyed, and the finger-like processes in the uterine end of the tube, resulting in occlusion or stricture, remain permanently adherent to each other, thus sealing the uterine end in addition to the fimbriated end, permanently blocking drainage, and giving rise to the pyosalpinx, which always remains as such until removed at operation. Dr. Murphy then pointed out that gonococci never invade the broad ligament, because they do not characteristically travel through the lymphatics into the connective tissue or into the glands. With staphylococci and streptococci, on the other hand, quite the opposite obtains. A pyosalpinx

never follows an abortion, unless there is coexistent gonococcal infection.

Second: A duodenal ulcer. The history read by the interne was typical, except that the attacks occurred in the summer and winter instead of spring and fall. The bluish scar of a duodenal ulcer was demonstrated upon the anterior wall of the duodenum, one and one-half inches beyond the pylorus. Owing to the shortness of the transverse mesocolon, as well as large deposits of fat, a rent for the passage of the jejunum could not with safety be made in it, so that the *postcolic* route was abandoned. Dr. Murphy therefore selected a fat-free site in the great omentum immediately below the lower border of the transverse colon. Through a rent here the jejunum was brought and adjusted in a clamp in such manner that its contents would flow in an iso-peristaltic direction, although this was not absolutely necessary. A portion of the anterior posterior wall of the stomach was also adjusted in a clamp. A suture of Pagenstecher thread bearing two needles formed the posterior line of seromuscular stitching. A half inch on either side of this line and parallel with it the wall of each viscus was puckered upon a straight needle, and the same procedure was repeated a quarter inch beyond each needle. The wall of each viscus was incised between the needles, and the looped thread borne by them made taut upon each portion of an oblong Murphy button. Each portion was grasped in a Hartman clamp, and the two halves driven home. The advantage of this button is that its elastic compression is an absolute safeguard against postoperative hemorrhage. The operation was completed by securing the rent in the omentum to the stomach, just above the line of anastomosis, to prevent postoperative hernia. The button makes a very neat anastomosis.

Third: A musculospiral paralysis following the previous wiring of a fractured humerus at another hospital. A callus could be felt on the outer side of the bone at its middle. The nerve was exposed by an incision along its course between the brachialis and brachioradialis muscles. It was surrounded by cicatricial tissue and covered by callus. The nerve was exposed first distally and then proximally, and upon removal of the callus a neuroma was found on each end. On applying the excitor to the proximal portion there was sharp contraction of the triceps, but distally there was no response. Each neuroma was excised until the brush-like ends of the fasciculæ of the neurons with their axis

cylinders were clearly exposed. Four sutures through the neurilemma accurately contacted these brush-like ends. A fat-fascia flap was prepared from the subcutaneous tissue proximal to the wound, and included the deeper portion of the subcutaneous fat and the underlying brachial fascia, exposing a portion of the biceps. This was wrapped beneath and around the nerve at the site of union. The wound was closed without drainage.

SECOND DAY

On Fridays Dr. Murphy invites a few visiting doctors to witness his dressing of cases on the fourth floor, in the southeast wing. The dressing-room is of white tile, with southern exposure. In front of the windows are two tiers of metal students' benches, which accommodate about ten. Beginning at ten o'clock, thirty-one cases were dressed, and, while the comments may seem fragmentary, yet they are necessarily so, and it is perhaps not amiss to jot them down.

The first case was one in which the right ulnar nerve had been sutured two days previously, and Dr. Murphy wished to inspect it for fear of a haematoma. None was present, however, and a wet dressing of denatured alcohol with one per cent. phenol was applied, and immobilization obtained by a wire splint, fashioned from ordinary bird caging, which may be bought in sheets by the square yard. Such a splint is light, durable, and easy to clean and to shape.

The second patient was a physician who had been operated upon for an aneurism of the brachial artery, endo-aneurismorrhaphy having been performed. The radial pulse beat very strongly.

The third patient was a little girl with a stenosis of the œsophagus, due to lye. One day she was so unfortunate as to swallow elder chewed to a pulp, and trouble began immediately; fortunately, the pulp came out itself. Dr. Murphy dilated the stricture with an acorn-tipped bougie, which passed the obstruction with a visible jerk. Later on he intends to insert radium, so as to bring about absorption of the scar. The bougie was guided by Mixter's thread.

Fourth: Tendon transplantation in the right forearm of a lad in whom the flexors were contracted from a pressure myositis following a dressing applied to a fractured elbow. The hyperextended position of the hand had been corrected, and it was quite evident that the elongated tendons were beginning to assume the duties of the flexors which had been involved.

Fifth: A patient upon whom arthroplasty of the right elbow had been performed two weeks previously. The superficial portion of the skin over the internal epicondyle of the humerus had ulcerated, an occurrence that Dr. Murphy stated was rather frequent, owing to the paucity of soft tissues in that region. The edges of the ulcer were approximated by adhesive plaster strapping.

Sixth: An upper extremity amputation (removal of scapula and clavicle with the arm) for sarcoma of the right humerus and chest. Here extra precautions must be taken to leave sufficiently thick flaps. The nerve stumps were so approximated as to form loops, thus lessening the chance of neuroma formation and subsequent neuralgia.

Seventh: Non-union of the right tibia, in which a transplant had been inserted from the left tibia. It was dressed with absorbent cotton wrapped in gauze and covered with rubber protective.

Eighth: An arthroplasty for ankylosis of the right knee from metastatic arthritis. Dr. Murphy endorsed the success of the procedure in suitable cases by stating that the man who objects to arthroplasty either cannot do it nor is he willing to make a proper endeavor to learn to do it.

Ninth: A boy who had had a cicatricial contracture of the right index-finger. The scar had been excised and a pedicled flap fashioned from the abdomen. Under gas-oxygen anaesthesia Dr. Murphy severed the pedicle at its base, removed the redundant tissue, and stitched the skin edges together.

Tenth: A patient who had undergone ablation of the right testicle for tuberculous epididymitis. A rubber-dam drain, which had been inserted to prevent haematoma formation, was removed.

Eleventh: A patient had been operated upon for carcinoma of the lip. While the neck was dressed after operation the face was left open and dry, since the application of a dressing would but result in a salivary poultice, and the trypsin of the saliva would be very irritating to the skin line of union.

Twelfth: An old gall-bladder case who had had five operations. At the operation nine days previously fistulae were present between the gall-bladder on the one hand and the transverse colon and duodenum on the other. A gastroduodenostomy had been performed, and a drain, which had been inserted into the hepaticoduodenal fossa, was removed.

Thirteenth: Arthrodesis of the left knee for tuberculosis. The ends of the bones were so fashioned as to result in concavo-convex approximation between the femur and the tibia, so that the bones could not be displaced. Formerly magnesium bobbins, screws, and wires were used to secure fixation, but this concavo-convex bone division and subsequent juxtaposition renders mechanical supports unnecessary, catgut suture in the capsule being the only support required. While removing the plaster cast Dr. Murphy noticed that the foot portion was unnecessarily heavy, and observed that this was a frequent error of technic. At the time of application of the cast a Gigli saw was inserted between the gauze dressing and the plaster, and the latter cut, so as to give free play for swelling of the limb.

Fourteenth: An excision of a scar from the right knee preparatory to performing an arthroplasty. The wound had healed by primary union, so that there was plenty of subcutaneous fat for the operation.

Fifteenth: A patient who had been operated upon for acute appendicitis. She was from out of town, and upon examining her in his office Dr. Murphy found a low temperature with a high leucocyte count, and advised immediate operation. This the patient refused; she left the office and upon arriving at the railroad station fainted. She was taken to the hospital in the ambulance and immediately operated upon. A *gangrenous* appendix was removed.

Sixteenth: The patient had undergone removal of the right kidney. There was a postoperative pyocyanous infection, for which Dr. Murphy stated that in his experience an autogenous vaccine usually results in prompt cure.

Seventeenth: An arthrodesis of the left knee-joint for active tuberculosis. There was already fair union.

Eighteenth: An open reduction of a dislocation of the left shoulder. The scar was situated on the antero-external aspect of the deltoid, having healed by primary union.

Nineteenth: An old case of osteomyelitis of the left femur. An operation had been performed elsewhere some time previous, in which the incision had been made through the quadriceps extensor muscle. The scar was adherent to the femur, a result that, Dr. Murphy said, usually follows an incision so placed, in consequence of carelessness and imprudence. Instead, the incision should always be placed be-

tween groups of muscles, and when he operated he incised between the flexor and the extensor groups.

Twentieth: An osteomyelitis of the lower third of the left radius in which, owing to the latency of the infection, there had been some doubt as to the diagnosis from sarcoma, since acute angiosarcoma has the same trauma relation as osteomyelitis.

Twenty-first: A patient who had been operated upon for an old lesion of the left tibia. Dr. Murphy ordered an adhesive strap placed along the front of the leg to prevent toe-drop.

Twenty-second: A child whose hip-joint had been operated upon, and who was wearing a Buck's extension. Dr. Murphy emphasized the importance of maintaining the limb in the position of abduction after operation.

Twenty-third: Patient had been operated upon for epididymitis, but provided no special features for comment.

Twenty-fourth: Removal of stitches from an abdominal wound.

Twenty-fifth: A bone-graft had been removed on account of a haematoma; this was the only instance in Dr. Murphy's experience where such intervention was necessary.

Twenty-sixth: The patient presented a diphtheroid infection as a sequence of an accident and the diphtheroid infection was not destroyed by the subsequent curettage. Dr. Murphy stated that nothing kills the diphtheroid germs in a wound. He swabbed the latter with phenol, following by alcohol, and then applied Moorhof's iodoform-wax. He remarked that stinking infections of the hand arising from fist blows upon the teeth, questionably diphtheroid infections, rapidly succumbed to the alkalinity supplied by sodium bicarbonate dressings.

The twenty-seventh case was very interesting. The patient had had a septic sore throat, which was followed by a cervical lymphadenitis. The lymph-node ruptured, or, as Dr. Murphy put it, exploded, the infection streaming into the general circulation. The bacillary emboli lodged in but did not destroy the joints, produced skin infarctions, and finally necrosis of the cornea. The skin lesions were luetic in appearance, but syphilitic reactions were negative. That the skin infarctions upon the legs appeared synchronously with the involvement of the knee-joints beautifully supported the contention of the metastatic nature of these infections. As soon as it can be prepared an

autogenous staphylo- and streptobacterin will be administered. (This had a wonderful immediate inhibitive and reparative effect.)

Twenty-eighth: A gall-bladder case which illustrated Dr. Murphy's method of determining the proper time for removal of drainage from the gall-bladder. He inspects the latter with the male cystoscope, and, when the lining mucosa is smooth and glistening, takes out the drainage.

Twenty-ninth: The patient had been subjected to left inguinal colostomy a few days previously. With the site of anastomosis now walled off, Dr. Murphy opened the bowel at this dressing.

Thirtieth: Traumatic severance of the right ulnar nerve above the wrist from an industrial accident. The first-aid dressing consisted simply in the application of iodine and a dressing. At operation the tendon of the flexor carpi ulnaris was united, in addition to the ulnar nerve. Drainage, consisting of a few silkworm-gut strands, was inserted as a precautionary measure.

Thirty-first: A patient who had undergone her fifth operation for recurrent endothelioma of the spinal cord. Dr. Murphy grafted lumbar fascia. In reply to a question as to why he did not use rubber tubing for drainage, he stated that any elastic pressure produced necrosis in every tissue in the body with the exception of the teeth.

THIRD DAY

The first case operated upon on Saturday was one of chronic appendicitis associated with bilateral hydrosalpinx. It is interesting in connection with the first case operated upon on the first day. Vaginal palpation in that case revealed the woodeny induration of inflammation, and here the soft, yielding elasticity of the tubal cysts. Immediately Neisserian infection was excluded, as set forth above. On the right side the hydrosalpinx was large, the occlusion five-eighths inch from the uterine cornu being complete, while on the left side the hydrosalpinx was smaller, since the stricture was incomplete. Both fimbriated extremities were closed, thus accounting for the patient's sterility. Clinically, the uterus was sensitive, and pathologically it was inflamed externally, and there had been metrorrhagia, so that the pathologic condition was problematical. Hysterectomy was decided upon according to Murphy's plan. The broad ligaments

were grasped by a clamp placed between the uterus and the ovary and extended down to the cervico-corporal junction of the uterus, and the broad ligaments divided on the uterine side down to their tips. Starting posteriorly, the cervix of the uterus was incised forward just below its junction with the body until the uterine arteries were exposed. These vessels are guides to the ureters, which lie to their outer side. The bladder was not pushed down by gauze dissection, but the incision proceeded upward and anteriorly to avoid that organ. After removal of the uterus the arteries were crushed by a special small angiotribe, in the grooves of which catgut ligatures were placed. The cervical stump was then top-sewed with catgut, as in Billroth's plan. The stumps of the ligaments were attached to the stump of the cervix, so as to prevent its prolapse into the vagina. The abraded cervical stump was covered over with peritoneum, lest it become a source of pain by contracting adhesions. Dr. Murphy stated that while the removal of the uterus is the easiest portion, yet the toilet of the stump must be accurately and carefully done. Upon opening the uterus a small polypus was found in front, which explained the bleeding. The operator observed that a small polypus the size of the little finger-tip may cause more bleeding than a sub-peritoneal fibroid the size of a hat. In closing the wound an ectropion of the parietal peritoneal edges was made to prevent adhesions. Dr. Murphy believes that the aponeurosis should be approximated with the same accuracy as the skin of the face. The rectus is not included in the stitch.

The second case was one of gastric ulcer. While the history was being read the importance of a statement by the patient as to the hour of the attack was pointed out, since it shows the onset to have been severe and sudden, otherwise the patient would not have had such a vivid memory of the hour. The hour was nine o'clock in the evening, an early food reaction that suggested gastric ulcer. Upon opening the abdomen an ulcer about the size of a nickel to the palpating finger was found upon the anterior wall of the stomach, near the lesser curvature and about two and one-half inches from the pylorus. There was an ancient pericholecystic adhesion between the gall-bladder and the omentum. The gall-bladder itself was green, showing that it was free from inflammation. A whitish appearance would have indicated chronic inflammation. Preparatory to excision of the ulcer it was enclosed by compression clamps placed in V-shaped relationship to

prevent escape of gastric contents into the abdominal cavity. The vessels on both sides were also clamped, a process that was facilitated by the cycling of the vessels. After excision of the ulcer the cut edges were approximated by a Pagenstecher suture closely applied through all coats and locked. The iodine was applied to the suture line. The line was reinforced by seromuscular Lembert stitches, which first closed in the gastric mesentery space, just as when dealing with the appendix. It is as true now as it was in Wölffler's and Billroth's time that the greatest danger is at the angles. Excision of an ulcer is very much more of a procedure than gastro-enterostomy, but when the ulcer is not near the pylorus it is a preferable operation, although it does not guarantee against recurrences.

The third patient was shown as a case of appendicitis in pregnancy, the appendix having been removed a few days previously. The mortality is alarmingly high because the enlarging uterus robs the appendix of its natural protectors—the caput coli and the omentum. The cycle is absence of walling-off, systematic infection lodging in the placental blood-spaces and causing miscarriage, infection of veins at placental attachment, and death. The appendix should be taken out early in pregnancy, if acutely or chronically diseased, thus being picked green and not allowed to ripen. It should be removed with the least manipulation.

The fourth patient was brought forth for a thoracotomy. The history was discussed by Dr. Mix. The patient had been coughing up cupfuls of pus three times a day for some time, and was suspected of having an abscess connected with a bronchus. The nitrogen compression treatment was not used because it was thought that adhesions existed between the pleura and the chest wall. Exploratory puncture in these cases is dangerous. Dr. Murphy cited a case of bronchiectasis in which the exploratory needle entered a vein, causing air-embolism and hemiplegia. Except in the presence of mixed tuberculosis and pyogenic infection the lungs have the greatest resistance to tuberculosis of any tissues of the body. An incision was made along the eighth rib on the left side. The periosteum was elevated, and about two and one-half inches of the rib excised by a special costatome. While the pleura was not adherent, yet an induration could be felt in the lung. It was decided to postpone opening into the abscess for two days, not that adhesions will form in that

time, but because the gauze packing will cause reaction of the pleura and cofferdamming, since the pleura is just as liable to acute infection as is the peritoneum. The abscess could also have been treated by pneumothorax-compression, and thus drained through the bronchus, because of the non-adherence of the pleura. The wound was closed by interrupted sutures of silkworm-gut, between the intervals of which a continuous catgut suture was placed.

The fifth patient was a baby with congenital club-feet. Subcutaneous tenotomy of the tendo achillis, followed by subcutaneous division of the plantar fascia just in front of the tubercle of the os calcis, was performed on each side. Such a young baby has no heel. It is best to do these operations as early as possible. The tendo achillis expands and reunites more than any tissue in the body. Its ends may be separated as much as two and three-quarters inches and yet heal together. The tendon of the tibialis anticus, on the other hand, would go up after division and stay up without union. The plantar fascia reunites equally well. When applying the dressing the strips of gauze were applied in a longitudinal, and not a circular, direction. Otherwise, in case of swelling, cutting of the plaster cast would be of no avail. Beyond the dressing, Dr. Murphy applied the plaster-of-Paris directly upon the skin, stating that better control is thereby secured in babies. The Gigli saw was used to cut the cast.

John Benjamin Murphy was born in Appleton, Wis., December 21, 1857, the son of Michael and Ann (Grimes) Murphy. He studied in the public schools of Appleton, graduating from the high school. As a youth John B. Murphy worked on his father's farm. Much of his tireless energy, endurance, and physical strength can be attributed to the outdoor work of that period of his life.

He began the study of medicine under Dr. John R. Reilly, of Appleton, as preceptor. Graduating with the degree of M.D. from Rush Medical College in 1879, he entered at once on his service as interne at Cook County Hospital and received his certificate from the hospital in 1880.

In the same year Dr. Murphy began the practice of medicine and surgery associated with Dr. Edward W. Lee, one of the attending surgeons at Cook County Hospital. From September, 1882, to April, 1884, he studied surgery in European hospitals. He married Miss

Jeanette C. Plamondon in 1885. Mrs. Murphy has always taken the keenest interest in all of his scientific work, and was a great stimulus, as well as factor, in his undertakings.

His first teaching position was that of instructor in surgery in Rush Medical College in 1884. He next filled the position of professor of surgery in the College of Physicians and Surgeons in 1892. For two years he was professor of surgery and co-head of the department in Rush Medical College. For the last fourteen years, with the exception of the two years (1905-1907) at Rush, he has been head of the Department of Surgery at Northwestern University Medical School. For more than thirty years he has been attending and consulting surgeon at Alexian Brothers' Hospital, and is now consulting surgeon for that hospital, as well as for St. Joseph's Hospital, Columbus Hospital, and the Hospital for Crippled Children. He is now attending surgeon and chief of staff at Mercy Hospital.

In 1902 the University of Notre Dame awarded him the Laetare Medal. In 1905 he was given the degree of LL.D. from the State University of Illinois; the University of Sheffield, England, the degree of D.Sc., in 1908; and St. Ignatius College that of M.A. He is a life member of the Deutsche Gesellschaft für Chirurgie, an honorary member of the Société Chirurgical de Paris, an honorary fellow of the Royal College of Surgeons of England, and a charter member of the American College of Surgeons. He has been president of the American Association of Railway Surgeons, the Chicago Medical Society, The American Medical Association, and the Clinical Congress of Surgeons of North America.¹

Dr. Murphy has written numerous articles, edits the General Surgery Volume of the Practical Medicine Series, and writes the valuable "Surgical Clinics of John B. Murphy," published bimonthly by the W. B. Saunders Company, of Philadelphia.

¹ Guy C. Hinsdale, INTERNATIONAL CLINICS, 12th Series, ii, 247.

AUTOPLASTIC BONE TRANSPLANTATION

BY VINCENT ANTHONY LAPENTA, A.M., M.D.

Indianapolis, Indiana

THE history of osteal transplantation can be said to have begun before the era of experimental work on transplantation of other tissues and organs. Ollier, before the age of asepsis, transplanted bone and periosteum with good results and many disappointments, which we now understand to have been due to infection.

While the transplantation of organs may be said to have yet to emerge from the experimental stage, that of bone has reached a stage of enormous usefulness and a very wide application. Indeed, it may be said to represent to-day one of the most glorious conquests of modern surgery. Before entering upon the consideration of the principles, indications, and methods of transplantation, etc., it is necessary to refer briefly to the theories of this work as well as to the histology of bone and periosteum.

There is at present a considerable amount of controversy in regard to the function of the periosteum in transplantation. The teaching handed down by generations, and comprising the work of Malpighi, Durante, Axhausen, Ollier, Pascale, and Lejars, distinctly, and I believe correctly, attributes to the periosteum the important function of not only nourishing bone, but of being the chief agent in bone formation in fractures and transplantations.

Of the modern authorities holding opposite views, it will be sufficient to cite Macewen and Cohen, who believe the periosteum to be nothing more than a limiting membrane, preventing the growth of bone in the soft tissues, and not at all concerned with osteogenesis in transplantation. Murphy not only holds this view, but believes that a transplant is not in itself osteogenetic, but only osteoconductive, and that to obtain success it must be in contact with living osteogenetic bone at either end.

The fallacy of these views is clearly demonstrated by the embryologic development of bone. The large amount of clinical results, emphasized by the excellently-conducted animal experiments of McWilliams, have most emphatically strengthened the teaching of the old masters in ascribing to the periosteum the chief rôle in bone formation.

Albee and Murphy, while holding the opposite views above mentioned, have, in all their human transplantations, as McWilliams has personally ascertained from them, always transplanted the periosteum. This practice is not in accord with their views.

Let us bear in mind that in the embryonal osteal development practically all of the bone formed in the cartilage is absorbed and destroyed by osteoclasts, to be quickly replaced by bone growing from the osteoblastic layer of the periosteum.

McWilliams's experiments emphasize the following conclusions:

1. That the periosteum is osteogenetic.
2. That bone transplanted with periosteum always lives and grows without regard of its being or not being in contact with osteogenetic bone.
3. That bone transplanted without periosteum generally dies and is absorbed, exception being made for very small transplants.
4. That the periosteum, far from being only a limiting membrane, plays the most important rôle in osteogenesis, and serving further to establish and maintain a satisfactory blood supply for the transplant.

Transplantations done with periosteum-covered transplants have been successful in 99 per cent. of cases, while those done with bone have succeeded only in 41 per cent. While the successes attained in transplantation with bone and periosteum obtained from the patient himself have been uniform and good, the same cannot be said for heterogeneous transplantation.

INDICATIONS FOR AUTOPLASTIC TRANSPLANTATION

1. In ununited fractures, properly performed transplantation will give 100 per cent. of results. While the fixation of these fractures by Lane's plates, ivory pegs, wire sutures, etc., is occasionally successful, these foreign bodies usually tend to favor non-union by in-

ducing a rarefying osteitis. They are frequently the source of future trouble by becoming loose and requiring another operation for removal. Thomas, in reviewing the results obtained at Cook County Hospital in fractures immobilized by Lane's plates, finds that in over 48 per cent. of all cases the plate had to be removed for suppuration. For each case these foreign bodies benefit there are 100 where they have been the cause of great harm.

2. Albee has been recently advocating fixation of fresh fractures by an autoplastic transplant, instead of Lane's plate. This is certainly correct and conducive to perfect results.

3. Autoplastic transplantation is used to replace bone destroyed from osteomyelitis; to replace the shaft of a bone lost by the removal of an osteosarcoma, etc.

4. In scoliosis following Pott's disease excellent results have been obtained. Albee has satisfactorily treated a large number of cases in this manner. Transplantation of an entire phalanx of a toe into a finger has been successfully employed by many in cases necessitating the removal of a phalanx.

In fresh fractures or in old ununited ones requiring immobilization and approximation of fragments, especially in comminuted fractures, I believe that autoplastic transplantation is far superior to any other form of fixation. Metal bone plates, external or internal pins, while occasionally successful, often cause a great deal of trouble and have been the direct cause of many amputations. These foreign bodies not only excessively traumatize tissues, but actually prevent bone regeneration. The autoplastic transplant not only immobilizes the fragments very effectively, but it adds stimulus to osteogenesis, often being the chief factor in reunion. No infection need be feared if your technic has been faultless; no plates, no screws to become loose and need removal.

GENERAL TECHNIC IN OSTEOPERIOSTEAL TRANSPLANTATION

As a most fundamental law to successfully transplant bone, we must regard asepsis. The aseptic technic must be extremely rigid. Next in importance we must consider the trauma caused by the soft tissue and bone. This must be minimal. Dissections must be made with delicacy. Removal of callus or eburnated ends of bone to be

FIG. 1.



Electric motor saw for bone surgery.

approximated and made ready to receive transplant must be carried out with gentleness and precision. Haemostasis must be perfect; a large collection of blood and serum in the wound will favor infection and cause complete failure.

TECHNIC IN UNUNITED FRACTURES

Fractures in the Shaft of Long Bones.—An incision is made over the fractured point as determined by the röntgenogram. The incision is usually from six to eight inches long. It is made in a position where the neurovascular structures will be avoided. Careful attention is paid to haemostasis. The callus covering the fractured ends of the fragments is cut away with the knife and chisel. The exposed fragments are examined, and, if the ends seem sclerotic, a small portion from each fragment is removed.

Now the periosteum is incised and reflected for a space 3 Cm. in width and 7 Cm. in length on each fragment. The bone of this denuded space is removed with the aid of a motor saw (Fig. 1) or a thin chisel. The saw is to be preferred, as the cut can be made more uniform and with greater rapidity. The incision in the bone must reach the medullary cavity and be oblique to prevent sinking of transplant in medullary cavity. A transplant of the exact dimension of the gutter is now cut from the crest of the tibia. Periosteum must be left attached to transplant, and it must reach in depth the medullary cavity. Thus we will have an approximation of periosteum to periosteum, bone to bone, and endosteum to endosteum (Albee). The transplant is laid in the gutter, where it is fastened in place with two kangaroo tendon sutures at each end, which have been applied through properly-drilled holes. If much eburnated bone has been removed, the resulting shortening is entirely overcome by inserting between the two fragments wedge-shaped pieces of bone with periosteum, obtained either from the tibia or from one of the fragments. A few interrupted catgut stitches complete the union of the transplant's periosteum to that of the bone. The soft parts are now closed *secundum artem*. A fixing plaster-of-Paris cast is now applied. It will be superfluous to state that the leg from which the transplant is removed and the field of operation have been carefully prepared according to aseptic technic. Proper surgical care is given to the closure of the wound of the leg from which the transplant has been obtained.

DESCRIPTIVE CASES

CASE 1.—Mrs. O'C., aged 52 years, sustained fracture, in August, 1913, of left humerus. This fracture failed to unite, and patient was advised by many surgeons to have arm amputated, as no union was possible. The X-ray picture shows that a double fracture had occurred (see Fig. 2), and that the intervening fragment had undergone a rarefying osteitis, which was fast spreading to the other fragments. On January 16, 1914, regardless of these discouraging evidences, patient was operated on, and the intervening callus was found to be represented by a putty-like substance with a fibrous surrounding that had invaded the soft parts. A large transplant was now removed from the tibia according to described technic, and fastened by kangaroo tendon sutures to the upper and lower fragments of the humerus. The putty-like mass was removed so far as possible, the internal aspect of it only being left, as it was strongly attached to the brachial artery and to the nerves. Notice result by accompanying photograph.

(A) Transplant has grown very dense bone between fragments of excellent consistency. Growth can be noticed to have chiefly taken place from periosteum of transplant.

(B) Note posterior aspect of picture, showing the fibrous capsule that was left attached to the artery and nerves having become ossified. This picture strongly emphasizes what an osteoperiosteal transplant will do even in a hopeless case. The osteogenesis stimulated by the transplant has caused bone formation in the fibrous capsule left (Fig. 3).

CASE 2.—Mr. G. T., aged 25 years, sustained a comminuted compound fracture at the middle third of the left tibia and fibula. Note state of fracture and fragments at the time of operation (Fig. 4). There was absolutely no union six weeks following fracture, and there was marked shortening of the leg. On July 6, 1914, patient was operated on. An intramedullary transplant was applied and held in place with kangaroo tendon sutures applied through properly-drilled holes (Fig. 5). Note perfect reduction and union of both bones. Shortening was entirely overcome.

TECHNIC IN UNUNITED FRACTURES IN THE NEIGHBORHOOD OF ARTICULATIONS

Incision is made about six inches in length over the most advantageous position. A large hole is drilled in the substance of each fragment by a $\frac{1}{2}$ -inch burr for about 6 Cm. in each fragment. This tunnel is filled with a piece of bone removed from the tibia. The transplant is forced in the opening and fastened with a kangaroo tendon suture at each end. The wound is closed according to surgical principles.

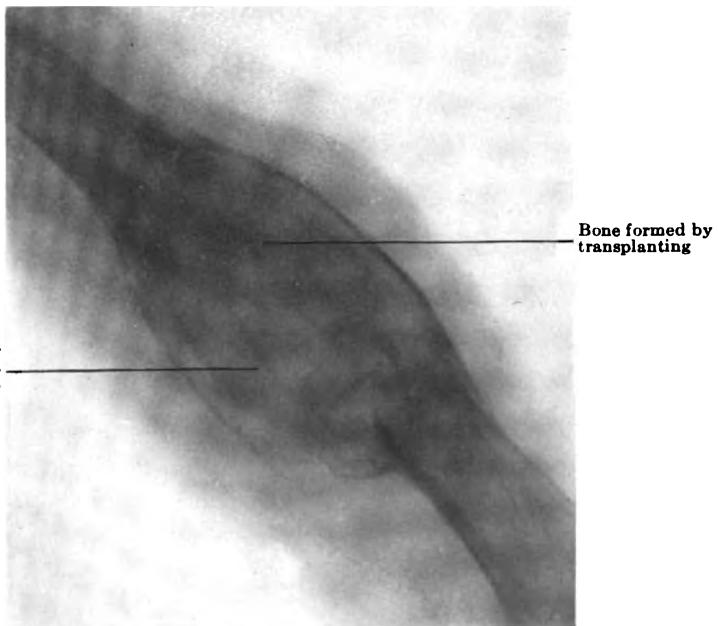
The dowel instruments of Albee are in this type of operation a real blessing. A bone pin of the exact size of the drilled tunnel can be obtained by Albee's dowel, making the operation a model of exactness.

FIG. 2.



CASE I.—Double fracture and absorption of intervening fragment.

FIG. 3.



Result of repair (Fig. 2).

FIG. 4.

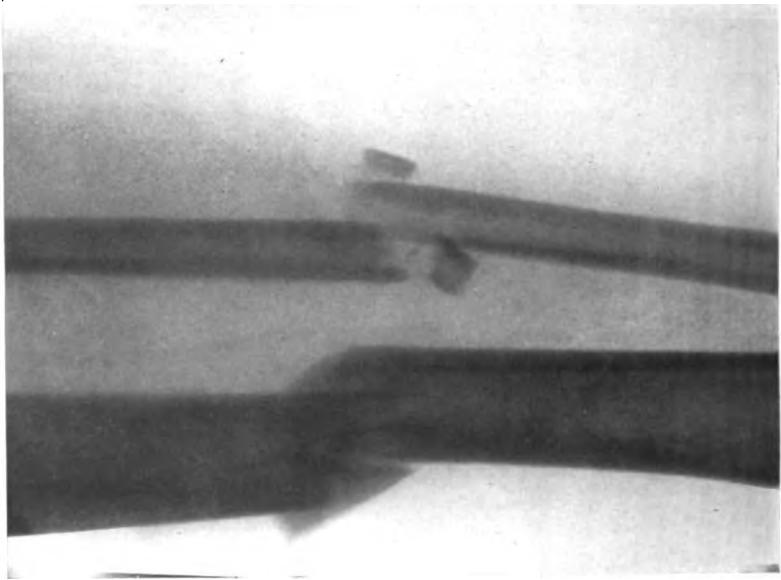
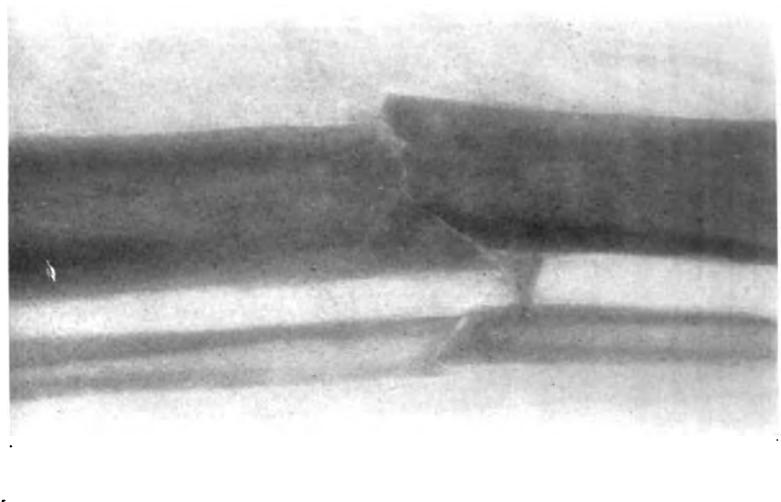


FIG. 5.



CASE II.—Before operation.

CASE II.—After transplantation.

TRANSPLANTATION IN FRESH FRACTURES

No matter what method of reduction we may employ, a large number of our fracture cases will show more or less shortening. I believe that, when the röntgenogram shows a marked overlapping of fragments with considerable shortening, the case should be treated surgically. Then, instead of metal plates, autoplasic transplantation will afford a perfect reduction, with no shortening and with assured union.

I employ Albee's technic. The fracture is exposed by a generous incision in the soft tissues, always keeping in mind the anatomic relations of important blood-vessels and nerves. A gutter about 4 to 6 Cm. long is cut on one fragment and about 3 to 4 Cm. on the other. The long transplant is made to lock over the fracture; the short one I place in the remaining gap. The transplants are held in place with kangaroo tendon sutures applied according to described technic. Immobilization is obtained by means of a plaster-of-Paris cast.

TECHNIC OF SPINAL TRANSPLANTATION IN POTT'S DISEASE

The excellent results obtained by Albee in the treatment of Pott's disease by the use of a spinal autoplasic transplant have been so convincing that the entire surgical profession has become enthusiastic over this procedure.

While the field of application is necessarily restricted to early cases, before ankylosis and excessive spinal curvature have developed this procedure is of great merit in properly-selected cases. Obviously, it can be of no benefit in the correction of a deformity of many years' standing; it is essentially a procedure to effectively prevent the deformity.

The seat of operation (the affected portion of the spinal column as determined by the röntgenogram) is exposed by a liberal incision in the soft parts over the spinous process of the vertebrae. With the aid of Albee's twin motor saw, a gutter is cut in each spinous process in as many vertebrae as it may seem necessary. An osteoperiosteal transplant, cut with the same saw, so as to be the exact size of the gutter, is now cut from the tibia and applied in the gutter bed. The transplant is secured with kangaroo tendon sutures through properly-drilled holes. The soft parts are closed, *secundum artem*. A plaster-of-Paris jacket is usually applied, or a perfect immobilizing brace can be used.

GENERAL CONCLUSIONS

1. Autoplastic bone transplantation can be said to be one of the most useful and successful procedures in modern surgery.
2. From all the experimental work and clinical observations, it remains proved that the periosteum is of the highest importance in transplantation. This is clearly demonstrated by the fact that transplantations done with bone and periosteum are successful in 98 to 100 per cent. of cases, while those done without periosteum are successful only in 41 per cent. of cases. The controversy as to whether periosteum has or has not a distinct osteogenetic function is of no great importance in the face of such marked clinical evidence.
3. In the treatment of ununited fractures, autoplastic bone transplantation is not only always successful, but gives us the means to overcome the shortening of limbs, which is by far the most marked deformity.
4. Autoplastic bone transplantation in fresh fractures is the best procedure to secure immobilization and perfect correction with assured union, superseding in the majority of cases all foreign bodies, such as steel plates, screws, etc.
5. Autoplastic osteoperiosteal transplantation gives us the means of saving many limbs and correcting many deformities.

I want to emphasize the importance of the great fundamental principles that will secure success; namely, perfect asepsis, careful haemostasis, and accurate immobilization, with strict adherence to technical details described.

ABNORMAL CONDITIONS FOUND IN OPERATING FOR FIXATION OF MOVABLE KIDNEY

BY SIDNEY F. WILCOX, M.D., F.A.C.S.

New York

A movable kidney is usually a healthy kidney, so far as its structure is concerned. The symptoms which arise from its mobility are due to interference with its function. This interference may, later on, induce conditions which may be considered pathological or, at least, abnormal.

In a series of over two hundred cases, many of them bilateral, in which I have operated for fixation of the kidney, four abnormal conditions have been met with.

Hydronephrosis, while not uncommon, is rarely met with during the operation, because the manipulation necessary to bring the kidney into view is likely to undo the kink or twist in the ureter and allow the imprisoned urine to escape into the bladder (Fig. 1).

Kinking of the ureter, with its train of agonizing symptoms—ordinarily known as “Dietl’s crisis”—is not an unusual condition where the kidney has attained a considerable degree of mobility, and the symptoms are often ascribed to causes other than the true one.

I have seen the subjective symptoms closely simulate the passage of biliary calculi, except that the attacks were of short duration and occurred with greater frequency than in a gall-stone case and, of course, were not followed by jaundice or finding the calculi.

Many cases of Dietl’s crisis are mistaken for attacks of appendicitis, and I have been called a hundred miles to see a case where appendicitis had been diagnosed and immediate operation urged, to find that all the symptoms had disappeared immediately on a change in position of the kidney. I am of the opinion that many healthy appendices have been removed under a wrong impression as to the true cause of the symptoms.

In operating on one case for a palpably displaced kidney, where the patient was suffering great pain, an expansion of the renal end of the ureter was found which held over a pint of urine. Aspiration of the fluid was necessary before room could be had to manipulate the organ and secure it in the loin.

In one case an unsuspected abscess was found on cutting down upon the displaced kidney. It is possible that a more skilful urinalysis might have established the diagnosis. However, there was no question as to the displacement of the organ. Fixation and drainage led to a cure.

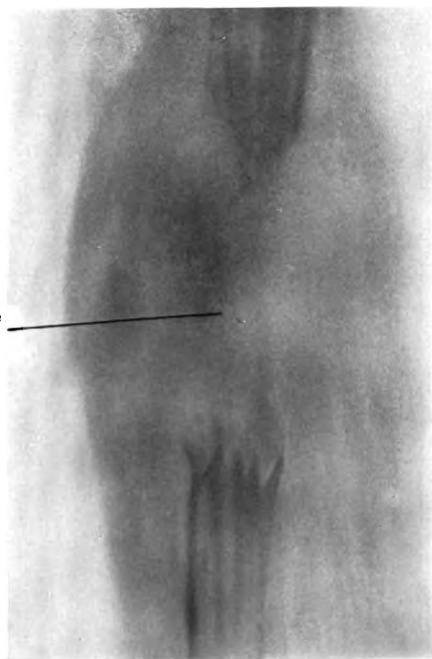
In one case of bilateral operation both ureters were found wrapped once around their respective kidneys like the single turn of a thread around a spool. In another case one kidney was so affected (Fig. 2).

In a number of cases where the reflex symptoms have been severe and of long standing fissured kidneys have been found. In these cases the kidney resembles a beef kidney, with fissures or grooves running irregularly over its surface. These fissures are caused by a cordlike thickening of the fibrous capsule. These cords are like an irregular network incorporated in the sheet of the capsule, and they cut into the cortex of the kidney. In some cases they are so tightly adherent to the kidney that some force is required to strip back the capsule, and sometimes even causing slight laceration and bleeding (Fig. 3).

That movable kidney may produce many serious reflex symptoms cannot be doubted by one who has had much experience. On the other hand, there are cases who suffer but little. As a rule, however, the very fact that the patient presents herself for examination proves that she is suffering from some cause or another, and I know of no other condition that can give rise to more and more varied reflex symptoms than a movable kidney, and the severity of the symptoms is not always proportionate to the degree of mobility of the organ. At the same time, the importance of concurrent enteroptosis, diseased appendix, uterine retroversion, and other abnormal conditions should not be underestimated.

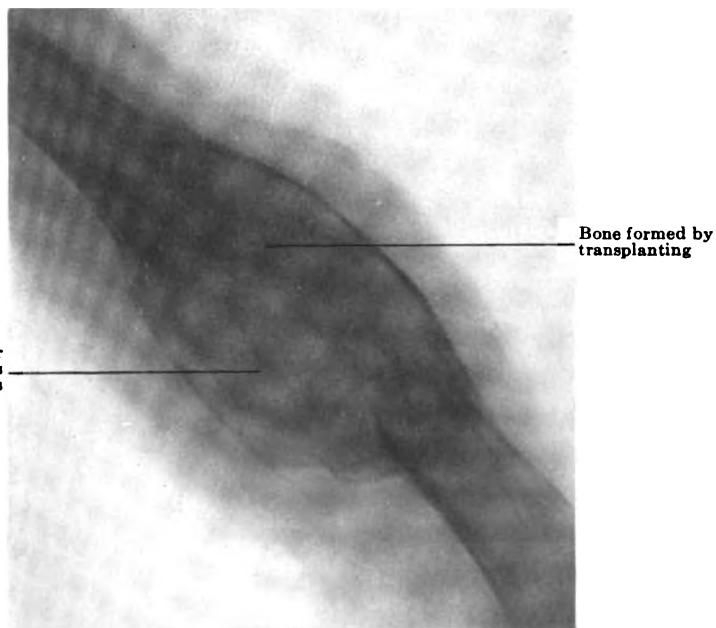
The benefit received from operation in suitable cases is often remarkable, and I know of no operation which is followed by a greater proportion of satisfactory results than nephropexy *properly performed* and followed by a sufficiently long rest in bed. I believe that the failures to obtain good results come largely from allowing the patient to get up too soon, and for that reason I insist on five weeks in bed and an additional week in the hospital. This is necessary, not for the healing of the wound, but to allow the new adhesions to become firm.

FIG. 2.



CASE I.—Double fracture and absorption of intervening fragment.

FIG. 3.



Result of repair (Fig. 2).

Fig. 4.

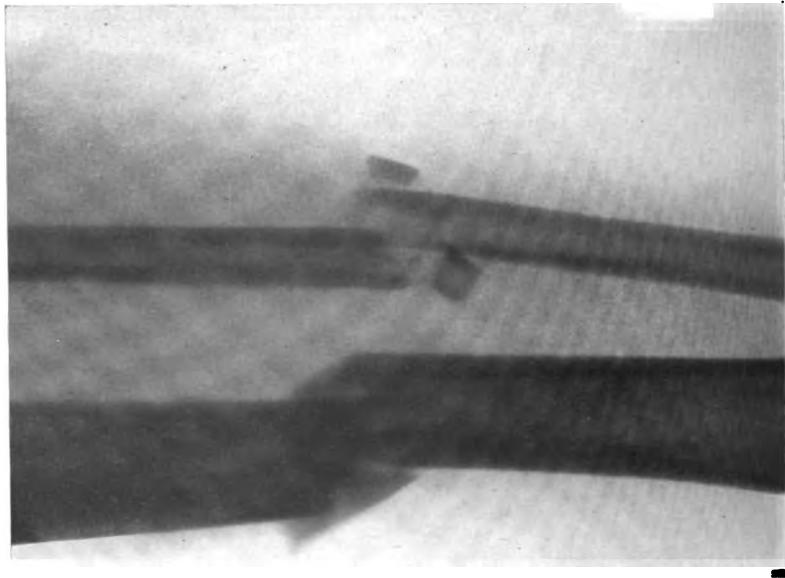
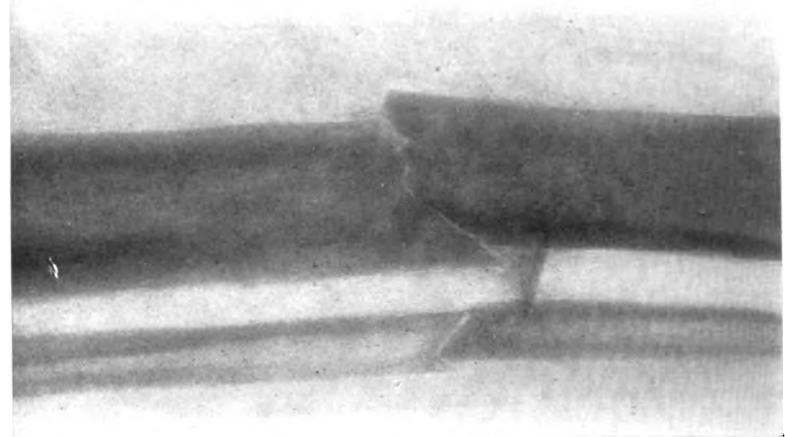


Fig. 5.



CASE II.—Before operation.

CASE II.—After transplantation.

THE HODGEN SUSPENSION PRINCIPLE IN THE TREATMENT OF FRACTURE OF THE FEMUR

BY WILLIAM BRADY, M.D.

Elmira, New York

FOR the physician in private practice, especially in country practice, the treatment of a case of fracture of the shaft or neck of the femur is always an anxious problem. Many of these cases are in elderly persons, and the necessary confinement to bed becomes a serious tax on vitality. If Buck's extension be the method of choice, the ingenuity and patience of all who come in contact with the patient is taxed to the utmost, no matter how efficient the nursing. The doctor is fortunate who can treat many cases of fracture of the femur by means of Buck's without seeing occasionally a bed-sore or a hypostatic pneumonia. From my experience I should say that the man who can carry a senile patient through to recovery by means of Buck's extension without a trained nurse and without a bed-sore is possessed of remarkable genius. And by recovery I mean a good functional restoration of the limb.

Undoubtedly the average practitioner is too conservative in his management of fractures in general, and of fracture of the femur in particular. He is almost superstitious in his complaisant adherence to nineteenth century methods. It is amusing to note the alacrity with which the younger men drop Buck's and adopt a more scientific method when the latter is clearly demonstrated; and how obstinately many of the older men hold to fixed extension in spite of all theoretical and practical objections to the idea. The man who still leaves splints on Colles's fracture six weeks generally refuses to depart from Buck's extension; he who discards splints in two or three weeks, and removes them daily for massage from the very beginning of treatment, readily appreciates the several advantages of Hodgen's principle and applies it in routine practice. We are apt to think of a fracture too much as a mere lesion of bone, and to make inadequate allowance for the more important injury of the soft tissues. We rely too much upon splints and not enough upon muscle relaxation.

POINTS OF DIFFERENCE BETWEEN BUCK'S AND HODGEN'S METHOD

In Buck's extension two fixed points are essential—the pulley-wheel and the pelvis. In Hodgen's suspension one fixed point only is required—the pulley-wheel in the ceiling. It is hard to fix a pelvis and a pulley-wheel for six, eight, or ten weeks without interruption; it is easy to fix a pulley-wheel for any length of time. In the case of an aged man or woman it is a death-defying procedure to tie the patient flat on the back in bed for several weeks on end. But there is no great danger to life involved in confining the same individual to bed for that length of time, provided reasonable liberty in moving about the bed and sitting up in bed is allowed. With Hodgen's suspension the patient is allowed such liberty, and that without in any way interfering with the treatment of his fracture.

I must confess that a purely theoretical conception of the Hodgen principle would never encourage such assertions. On first sight it looks altogether too scientific, too complicated, too good to be true. That is the way it looks to every one who first investigates it, and that, I suppose, is why so many practitioners continue to torture their patients and worry themselves with the surgical pillory. However, one trial "on suspicion" not only proves a pleasant surprise but makes the investigator regret that he has ever inflicted the surgical pillory upon any defenceless creature. A single case of simple or compound fracture of the femur or the neck of the femur treated with Hodgen's suspension converts the unbeliever to its use as a routine method.

Of course, physical comfort for the patient and mental comfort for the attendant would not be sufficient alone to make one discard the old and try the new. The careful man wishes first to know something of the results obtained by the proposed method. The results are so much more satisfactory than one ordinarily anticipates when fixed extension is used that I hesitate to cite cases, for fear I may be accused of blind enthusiasm. The sole purpose of this article is to persuade the reader to utilize Hodgen's principle at his first opportunity; the functional and anatomical results may safely be left to speak for themselves. After a reasonable amount of experience with Hodgen's suspension one reads descriptions of the plaster spica abduction treatment and of radical wiring operations with an unsatisfied curiosity as to the indications which can possibly call for such treat-

ment. And as history after history accumulates in one's experience with suspension it becomes a grave question whether the ardent advocates of these formidable methods really understand or grasp the principles of Hodgen's suspension. But, whatever arguments may be offered in behalf of these more radical plans of treatment for fracture of the femur, the unbiased observer cannot but admit that suspension is a long step in advance of the method of Buck.

THE SCIENTIFIC PRINCIPLES INVOLVED

In theory Buck's extension seems plausible and sound; in practice we all know that it is disappointing. In theory Hodgen's suspension may seem a trifle fine-spun in the mind of one not familiar with the laws of physics, but in practice it serves its purpose so well as to dispel all doubt on that score. Though apparently complicated, Hodgen's apparatus is in reality more simple and easily managed than Buck's. Besides eliminating the unnecessary fixed pelvis, it also eliminates the weights hanging on the foot of the bed, the sand-bags or coaptation splints, and the fracture box or inclined plane so frequently resorted to when Buck's extension is employed. Hodgen's substitutes the weight of the limb itself for the pulling force supplied by the weights in Buck's; it makes the muscles of the thigh and hip coaptate the fracture perfectly; it eliminates the unknown factor of friction in estimating the extension force actually working on the lower fragment; and, finally, it permits physiological flexion and abduction at the hip-joint, together with flexion at the knee-joint, the position of greatest comfort for the patient and readiest coaptation for the fragments in any case of fracture of the neck or shaft.

The tense hamstrings and psoas in Buck's extension tend to displace the fragments, notwithstanding futile efforts to hold it with sand-bags or coaptation splints. These muscles are so thoroughly relaxed in Hodgen's suspension that they offer no resistance to reduction by the extension force. But a more important factor of accurate coaptation in Hodgen's is the *unremitting extension secured by reason of the elasticity of the extension force*. The extension of Buck's is a dead pull and an imponderable quantity, because the amount of force lost in friction cannot be estimated with reasonable accuracy. In Hodgen's the pull on the lower fragment records itself to the frac-

tion of the pound every instant upon the spring scale in the suspending cord.

Movements of the patient in Hodgen's suspension do not cause sudden interruption of the extension force, as in Buck's extension. One should think of the extension force as a pull acting from a fixed centre, the pulley-wheel in the ceiling, along a radius, the pulley-cord and the patient's limb, upon a movable point, the pelvis. So long as the pelvis moves only in the circumference or arc limited by the width of the bed, the pull is not appreciably influenced. Thus the patient can turn in bed, sit up, lie down, assist himself in many ways, without disturbing either the extension force or, as obviously follows, the coaptation of the fragments, because the pull holds the fragments in position. Any motion produced by the patient's activities occurs, not at the seat of fracture, but at the hip-joint. Not so in Buck's extension. Every move disturbs the fracture, as is forcibly evident in the patient's outcry.

The fact that the patient in Buck's does not remain immovably fixed, as would be theoretically necessary, but really moves or is moved many times a day, proves that absolute immobility of fragments is not essential to union. Indeed, it is considered better in most fractures that a degree of mobility within reasonable bounds be encouraged as a natural stimulus to bony union. Still, it is obvious that any sudden, complete relaxation of the extension force in the earlier days of treatment tends to overlapping or angulation, with shortening of the limb, as so frequently happens, despite all precautions, when Buck's extension is employed. Yet, in order to properly attend to toilet and prevent bed-sores and hypostatic congestion, the pull of Buck's must, at times, be removed momentarily. With Hodgen's suspension, on the other hand, cleanliness and toilet can be maintained with as little difficulty as in any bed case, and without interrupting the extension force for an instant. In fact, the extension of Hodgen's is at all times completely under the physician's control, unlike that of Buck's. Friends never find it necessary to minister to the patient's sufferings by temporarily resting the weights on a chair; they do not realize, any more than does the patient himself, that there is any pull on the leg. The reason for this is that Hodgen's pull is very elastic, resembles the extension the intelligent physician might

make with his own hands to enable the patient to be moved, for instance; while the pull of Buck's—what there is of it—is dead.

Twenty-five pounds of weights attached to the cord of Buck's by no means signifies that that degree of extension force is acting against the contracted muscles. Just what the actual pull delivered at the thigh may be depends upon various individual factors, but may be practically *nil* even with such a weight on the cord. As shall be shown, the actual pull in Hodgen's can be accurately measured at all times.

DESCRIPTION OF THE APPARATUS

The frame is made of iron wire the thickness of a lead pencil or a trifle lighter for lighter patients. A tinsmith or mechanic can construct it in less than an hour. The only measurement necessary

FIG. 1.



Brady's frame.

is the length from the patient's perineum to a point four inches below the sole of the sound foot. That will be the length of the frame. It is made by bending the long iron rod or wire into a U with square angles, the breadth of the base being about four inches, or a trifle wider than the width of the ankle at the malleoli. Small iron rings half an inch in diameter are soldered to the frame, one at each free end, one about four inches from each free end, one about ten inches from each lower angle—six upright rings in all. At each lower angle a stout upright wire post or loop two inches high is soldered firmly, to which the adhesive extension straps will be tied. A wire wicket, arching four or five inches from its base line, should be hooked into the outer wire ring at the free end, and left free to hook or unhook with the wire ring on the inner free end. The purpose of this wicket is to steady the free ends of the frame under the weight of the limb, preventing undue spread or give when the apparatus is in place (Fig. 1).

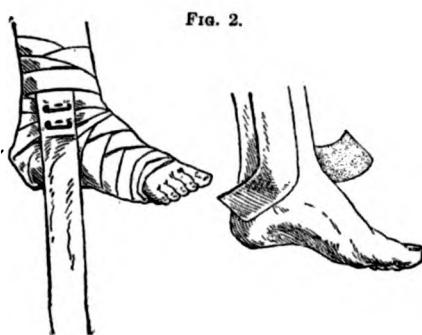


FIG. 2.

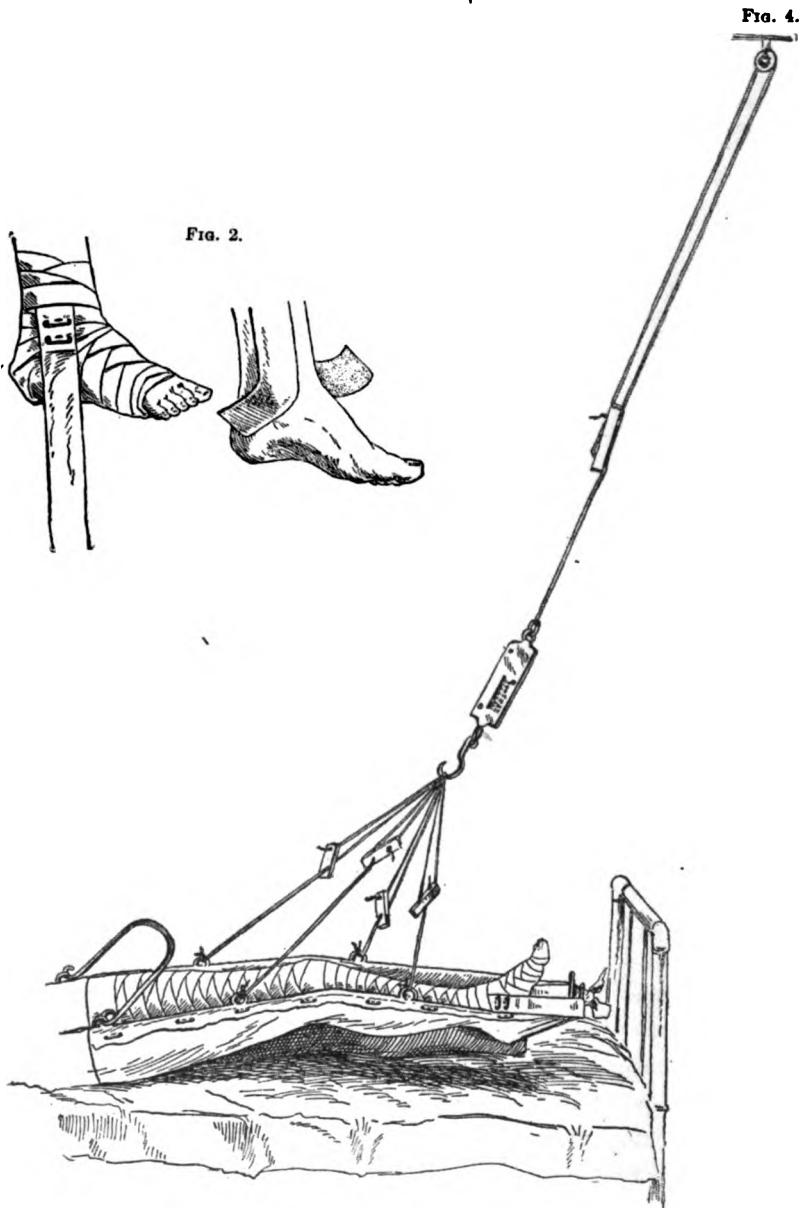
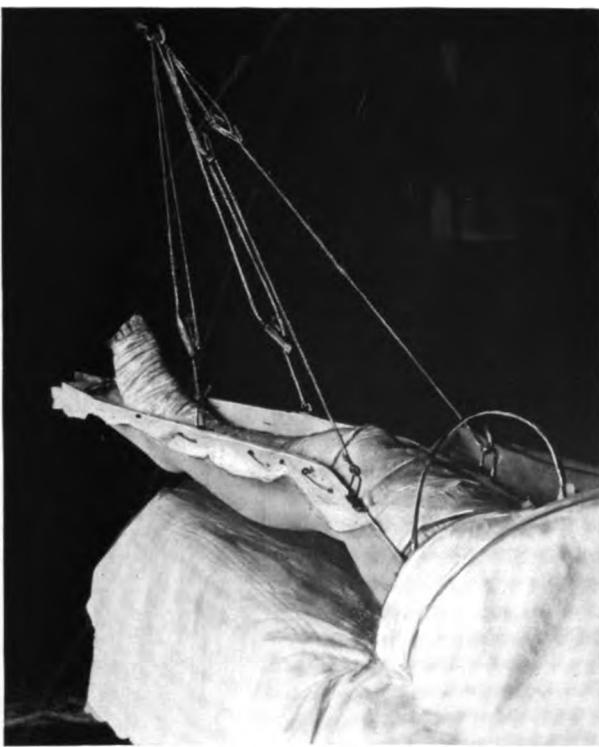


FIG. 4.

The hammock is a piece of stout muslin, through which buttonholes should be cut at points coinciding with the six wire rings and the two upright wire loops, allowing plenty of slack to accommodate the

FIG. 3.



Abduction of femur by use of the Brady splint.

bulk of the thigh, the calf, and the depression of the heel. Slip the muslin over the rings on the frame, and temporarily pin it upon the frame with half a dozen or more large safety-pins.

Next tie a 40-inch length of waxed express twine to each of the four supporting rings, and fix a small, hardwood tent-block to each cord in such a manner as to leave the loop above the tent-block free to slip over the hook of the spring scale. The tent-blocks should be about $2 \times \frac{3}{4} \times \frac{1}{2}$ inch, with holes just large enough to take the cord. To the handle of the spring scale tie a twelve-foot (or longer, depending on the height of the ceiling) sash cord; run the other end through a larger tent-block, $4 \times 1 \times \frac{3}{4}$ inch in size. Then carry the end of the cord through the pulley-wheel, which should be screwed into a rafter in the ceiling some four feet beyond the plane of the foot of the bed and about two feet to the right or left of the sideboard, depending on the limb which is injured. This is for the purpose of giving a marked abduction to the limb. Run the cord back through the large tent-block and knot it (Figs. 2 and 3).

The leg is shaved and strapped with two-inch strips of plaster as for Buck's extension, except that separate pieces are applied on each side instead of one continuous piece. Leave about five inches free at each malleolus, and turn it back upon itself, thus forming a $2\frac{1}{2}$ -inch tab hanging from the malleolus, with no adhesive surface exposed. Spiral turns of plaster above and below the knee add to the security of the dressing. The upper limit of the plaster strips should be just opposite the point of fracture. Pad the malleoli with layers of cotton, and bandage the entire limb in a flannel roller from toes to perineum, leaving the two plaster tabs hanging out. To each of these tabs attach a 16-inch strip of stout muslin bandage by means of two strong safety-pins placed at right angles to the length of the strips and parallel with each other (Fig. 4).

APPLYING THE APPARATUS

Now all is ready to apply. Have an assistant lift the limb by the foot and make steady, moderate extension while you slip the frame under the thigh and bring the free tip well up to the perineum. Hook the wicket in place. Draw the free muslin strips through the wire posts at the lower end and tie them together in a bow knot below

the sole of the foot. Adjust the hammock more accurately to the contour of the limb by means of safety-pins. Attach the four supporting cords to the spring scale and weigh the limb by lifting it gently from the bed. Let us say it weighs approximately 20 pounds. Let it rest on the bed again, while you adjust the sash cord and the smaller supporting cords. Now haul up the leg by traction on the larger tent-block, just enough to lift it free from the mattress. Again adjust the cords, and, with the aid of the assistant, give the frame a downward bend opposite the knee-joint, about 20 degrees. Haul away once more and lift the heel three or four inches from the bed. Adjust the cords to make even traction on all four rings and to lift the thigh just off the mattress sufficiently to permit the flat hand to sweep freely up to the buttock underneath.

It will now be seen that the spring scale records something in excess of the weight of the limb—say 28 pounds. The additional amount represents the force actually working as an extension force upon the thigh muscles.

The traction has a tendency to draw the patient toward the foot of his bed. In order to overcome that, raise the foot of the bed on four-inch blocks, removing the lower pair of castors for greater stability, but leaving the upper castors in place to facilitate moving the bed.

At first there will be more or less giving or sagging everywhere. But this can be gradually corrected, and in the course of an hour or two the limb can be placed and kept about as desired. On the average, an extension force of from five to eight pounds will be found ample to maintain reduction. Of course, there will be an inch or two inches of shortening apparent for the first several days, but by the end of a week or eight days it will be found invariably that this shortening has entirely been overcome by the steady pull.

A moderate abduction of the thigh on the hip is given by the location of the pulley-wheel in a plane to one side of the bed. This may be increased or diminished at will by swinging the head of the bed about. The bend of the frame gives a natural flexion to the knee, and consequently to the hip, and this relaxation of muscle accounts, in part, for the effectiveness of the moderate extension force of Hodgen's method. These desirable conditions are not obtained in Buck's extension, and the flexion is not obtained by Whitman's spica-abduction method for fracture of the neck.

A glance at the spring scale at each visit tells the physician exactly how much extension force he is applying—a thing he can never know with Buck's method. There is no friction of the limb upon the bed to interfere with the extension force. When the patient slips toward the foot of the bed the pull decreases; and when he is drawn back toward the head of the bed, or, what is more usual, when he draws himself back, the pull increases again. And, since he feels most comfortable when the extension force is just right to maintain accurate coaptation, the patient, even if a young boy, soon learns to keep the pull about right. Owing to the fact that the limb hangs free of all interference, the patient's movements are not painful, because they do not disturb the position of the fragments; the limb, as it were, is detached from the body.

The patient can manage the bedpan and dress himself from the very first. He can sit partially upright at any time, by his own effort, without disturbing the fracture. Such a movement merely causes the slack to be taken up by the elastic traction. The patient can move freely from side to side in bed to assist in changing the bed linen. In fact, he is almost independent of his nurse. And right here comes a serious drawback about Hodgen's suspension: Once applied, it works automatically, and the only excuse the doctor has for visiting the patient is to make sure he doesn't get too frolicsome!

MINOR DETAILS OF MANAGEMENT

Coaptation splints and sand-bags are superfluous. The uninterrupted pull keeps the thigh muscles from retracting and displacing the fragments; flexion and abduction aid in maintaining good reduction. The muscles serve as a sufficient splint. The apparatus reduces and holds the fracture as thoroughly as though the doctor himself could endure the task of sitting there holding the limb for several weeks. Every indication is met from the scientific standpoint; every hope is realized from the practical side.

The doctor's chief function is to see that a minimum pull of four pounds is always recorded on the scale. At each visit he should observe the following points: See that the heel is not too hard pressed by the hammock; if necessary, place a padded ring under the heel, or cut a small hole in the hammock. Keep the hammock snugly fitted to the limb everywhere by means of safety-pins or needle and thread.

No excessive pressure should be made upon the calf, and the bulk of the thigh should not be crowded. The limb should rest about two-thirds below and one-third above the level of the arms. The adhesive straps should pull straight, in the axis of the limb, and not at an angle: this is assured by keeping the hammock so adjusted that the malleoli are on a level with the frame. All these details may seem troublesome, but in practice one can grasp the situation and meet every requirement without any trouble whatever.

Inversion or eversion is overcome gradually as the muscles tire and succumb to the unremitting pull. By the time the limbs measure equally, from iliac spine to tip of inner malleolus, all eversion will have been overcome. If eversion is unduly pronounced in a given case it can be counteracted by tightening up the outer pair of supporting cords, thus tending to roll the limb inward.

In young patients it may be necessary to place a three- or four-pound sand- or salt-bag upon the frame, not upon the limb, in order to give sufficient weight to overcome the shortening, when the limb itself is too light to meet the resistance of its own strong muscles. As a rule, however, the necessary pull can be applied by simply drawing the bed farther away from the plane of the pulley, and raising the foot of the bed an inch or two higher than before. In very heavy patients, the obese, the excessive weight of the limb is too much for the atonic muscles. This will necessitate drawing the bed toward the pulley. In any case the amount of extension force is a negligible incident after the first three weeks. From that period onward the physician's only care is to see that the limb is kept suspended, with or without an actual pull, as the patient's comfort dictates. In certain cases it may be advisable, at this time, to apply a light plaster spica or other supporting apparatus and get the patient up on crutches.

A limb may be taken out of Buck's at any stage of the treatment and put in Hodgen's. When this is done the patient usually wonders why the doctor didn't think of it before. So does the doctor, when he observes the wonderful freedom and ease the apparatus gives.

Always see that the thigh is free from the bed, by sliding the flat hand under it, well up to the buttock; also make sure that the foot of the frame does not impinge against the baseboard of the bed, for obviously that would remove all extension from the limb.

EARLY USE OF THE LIMB SHOULD BE ENCOURAGED

The length of time the extension is maintained must be determined in each individual case according to the conditions present. I find that in fractures of the shaft it is advisable to remove all dressings as early as possible and encourage the patient to use the limb; I customarily place patients on crutches two or three weeks sooner than the text-books advise, because I am convinced that functional results are better when the patient gets about early. In fracture of the neck I am more timid, though inclined to early cessation of treatment. Six weeks is none too soon to get some patients on crutches, especially elderly patients. The same general rule applies in all fractures of long bones. Stiffness of the knee and prolonged disability are certainly less marked in the histories of those patients who are early persuaded to use crutches. Few patients will throw away their crutches as soon as the doctor would have them, if left to their own inclination. Hence it is well to set a time and be arbitrary about it, substituting first a cane for one crutch, then taking away the other crutch, and finally making the patient walk without support.

After the third week, when extension is no longer important, the foot of the bed may be lowered again. The limb should have a thorough massage each day until the patient gets up on crutches.

Physicians unfamiliar with Hodgen's method are often greatly discomfited at the sight of the patient's remarkable activity. It looks dangerous when the patient sits propped up on pillows, idly swinging his limb to and fro, or drawing himself up in bed by means of his arms and sound leg "Do not such movements displace the fracture?" they inquire. Well, suppose you were making extension on the limb with your own hands. You could swing it about pretty freely, so long as the patient remained fixed, and yet not disturb the fracture, because your unrelaxing pull would hold the bones in position. Now just reverse the process. Suppose you were to hold the foot in a fixed position and maintain a steady pull; could not the patient move from side to side of the bed without displacing the fragments, so long as you maintained an unvarying pull? Certainly he could. Your extension splints the fracture. Now suppose you were to use eight or ten feet of rope and maintain the same continuous traction. Obviously the patient would have still greater freedom of movement; so long as you could keep up the steady pull he could lift himself about

the bed quite freely without disturbing the relations of the bones. The fracture cannot be displaced so long as the extension force is not interrupted, and the extension force cannot be interrupted while the limb remains suspended and the patient remains in bed! Occasionally a patient, after the first two weeks, does venture to get out and sit in a chair near the bed with his limb swinging free; and, startled though the doctor may be to come in and find his patient up in a chair, the fracture, nevertheless, unites without deformity.

The longer the suspension cord—the higher the ceiling, in other words—the better. A long radius means a larger arc of liberty for the patient. In hospital wards with lofty ceilings the screw pulley may be permanently left in place over certain beds for fracture cases. In private houses it is sometimes possible to utilize the well of a staircase for the suspension cord, especially where the ceilings are very low.

Since there is not a great difference in the length of the limb in different persons, it is a good plan to have on hand three Hodgen frames ready to use. These may be made 27 inches, 32 inches, and 36 inches long.

It is hoped that this description will help to increase the popularity of the Hodgen method. There is every reason to believe that it would have become the method of choice long ago if the profession had really grasped the principle involved. John T. Hodgen was a genius in advance of his time. His teaching went over the heads of his contemporaries. His technic was rather too scientific for the minds of his colleagues.

Nowadays much attention is devoted in all lines of operative and therapeutic work to the effort to augment the patient's comfort, and hence his welfare. A more considerate technic is the rule in both medical and surgical progress. If we do not misjudge the trend of practice, Hodgen's suspension will be the method of choice in future for the treatment of fracture of the neck and shaft of the femur. Although fixed extension gives fair results in some hands, elastic suspension will give results at least equally satisfactory in the general run of cases, from the functional as well as the anatomical standpoint. At the same time, Hodgen's suspension vouchsafes an immeasurably greater degree of comfort for the patient than is possible when fixed extension is used.

CHORIONEPITHELIOMA ASSOCIATED WITH SEVERE INTRAPERITONEAL HEMORRHAGE

BY

THEODORE A. ERCK, M.D.

Associate in Gynæcology in the Philadelphia Polyclinic and College for Graduates
in Medicine; Associate Surgeon to the Gynæcean Hospital,

AND

GEORGE W. OUTERBRIDGE, M.D.

Out-Patient Surgeon and Pathologist to the Gynæcean Hospital; Assistant Gynæ-
cologist to the Methodist Hospital; Obstetrician to the
Maternity Hospital, Philadelphia, Pa.

CHORIONEPITHELIOMA of the uterus is a type of tumor whose occurrence is so regularly accompanied by more or less severe and protracted external hemorrhage from the genitalia that in the absence of this symptom the mind of the physician will hardly be directed even to the possibility of the existence of such a condition. A case which has recently come under our observation, however, illustrates clearly the possibility of the occurrence in the uterine wall of a well-developed, malignant chorionepithelioma, without the slightest evidence of external hemorrhage, and since it is not only an example of an extremely unusual mode of development of this tumor, but presents also some features of marked interest from the standpoint of diagnosis and treatment, it seems well worth being placed on record.

In October, 1913, Mrs. P. S., aged 27 years, nullipara, had a miscarriage at about the second month, following which she was curetted at a hospital in this city. As we have subsequently learned, the surgeon at the time commented upon the large amount of material removed from the uterine cavity, and remarked that it was rather suggestive of hydatid mole. So far as we have been able to ascertain, however, none of this tissue was saved or subjected to microscopic examination.

Following the curettment, the patient had a slight amount of irregular bleeding until January, 1914, when the periods for a time became regular, occurring every three weeks. After a normal period

in March, however, irregular bleeding began again, and early in April she consulted a gynæcologist, who suggested a trial of the ordinary styptics, not knowing anything of the previous suspicious history. As only temporary relief was obtained, the following month one of us was consulted (T. A. E.). There were no symptoms present at this time other than the metrorrhagia. Examination showed the uterus slightly retrodisplaced and somewhat larger than normal, but freely movable; both ovaries were enlarged and cystic. Again, in the absence of all knowledge of the antecedent hydatid mole suspicion, ergot and *nux vomica* were prescribed, following which the patient left town, but reported by letter that her flow had stopped. Menstruation was normal in August, but she went somewhat over time in September, and then had only a slight show; she had morning nausea, and thought herself pregnant. In October she again missed her period, but a few days after the time that it was due she was suddenly seized, while at a hairdresser's, with such violent abdominal pain as to completely prostrate her. She fainted, but did not vomit. The hastily-summoned family physician found her exceedingly weak, with pain in the epigastrium, nausea, and a pulse of 100. Vaginal examination at this time showed the presence of a tender mass in the pelvis, with extreme tenderness and rigidity over the entire abdomen, particularly in the epigastric region. The woman presented every appearance of having had a sudden, severe internal hemorrhage, and, in view of the history and these findings, a diagnosis of ruptured ectopic pregnancy was made. The pulse was rapidly going up and the patient's general condition becoming alarming; she was therefore transferred at once to the Gynæcean Hospital for operation.

Operation (T. A. E.).—Upon opening the abdomen the peritoneal cavity was found filled with a large amount of free and clotted blood, which spurted out under considerable pressure when the peritoneum was first incised. Both ovaries were multicystic and moderately enlarged, the tubes were normal, and the uterus showed the area of perforation described below. A rapid supravaginal hysterectomy was performed, with removal of both tubes and ovaries, the condition of the patient not permitting of any more radical procedure. Under the influence of salt solution intravenously and active stimulation she gradually rallied, but on the following day still had a pulse ranging from 154 to 160, and a hæmoglobin count of 20 per cent. Her con-

FIG. 1.

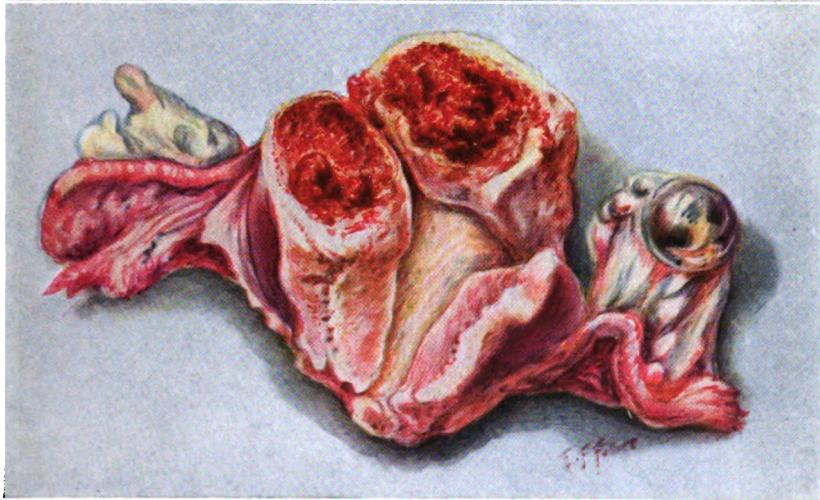
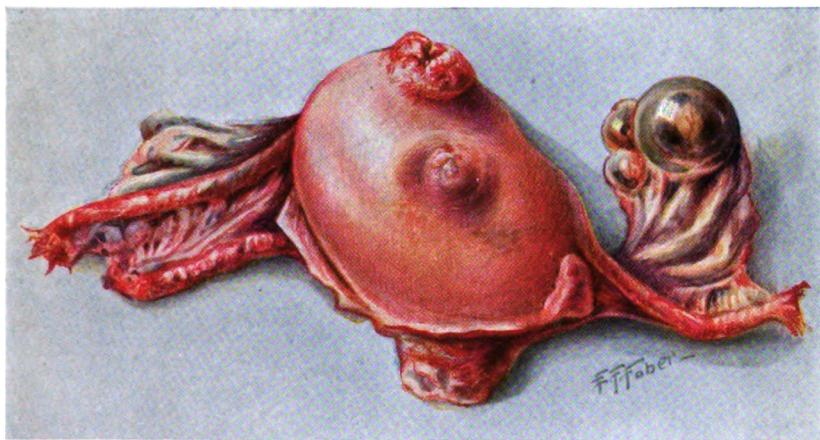


FIG. 2.

FIG. 1.—Anterior view of extirpated uterus and appendages. Projecting from the fundus can be seen a nodule of tumor tissue, which has eroded through the serosa, and from which the hemorrhage occurred. Beneath this is a smaller nodule, which has not quite reached the point of erosion.

FIG. 2.—The uterus has been opened through the anterior wall. The tumor mass is seen in the fundal portion, but the area of erosion through the serosa is not shown in this view. The uterine cavity and endometrium are entirely uninvolved.

dition remained critical for another 24 hours, but then gradually improved, and she left the hospital in good condition at the end of three weeks, the haemoglobin still registering only about 40, however.

*Specimen.*¹—This consists of uterus and adnexa. The uterus measures 8 × 6 × 4 Cm. The external surface is free from adhesions, but the contour is somewhat irregular, especially in the fundal region, owing to the presence of several nodular protuberances. The fundus rises considerably above the level of the tubes, and at the highest point there is an area of erosion about 1.75 Cm. in diameter, through the centre of which a probe can be easily passed deep into the substance of the uterine wall (Fig. 1). Below and somewhat anterior to this point is a slightly smaller, elevated, congested, and distinctly softened area, which has not yet perforated the serosa, but is evidently on the point of doing so. On opening the specimen through the anterior wall (Fig. 2), the walls are seen to be of about normal thickness, except in the fundal region, where this is considerably increased; here the wall is occupied throughout most of its extent by an irregular cavity filled with blood-clot, on removing which the cavity is seen to measure about 3 × 2 Cm., and to be lined by very rough, friable, yellowish tissue. The cavity is separated from the serosa by a narrow zone of apparently intact muscle tissue, except at the point of erosion mentioned above, where it is in direct communication with the exterior. The uterine cavity is about normal in size, and is lined by smooth, pale endometrium, which is everywhere intact, at no point showing any invasion or erosion by the tumor. A zone of muscle likewise separates it at all points from the tumor cavity. The tubes are normal; the ovaries contain several small, thin-walled cysts, evidently of follicular origin.

Microscopic sections (Fig. 3) taken from various portions of the uterine wall surrounding the tumor cavity show the typical picture of a chorionepithelioma. The muscle tissue is everywhere being eroded by masses of syncytium and groups of medium-sized round cells with fairly distinct cell boundaries and deeply-staining nuclei, easily recognized as Langhans's cells; throughout the deeper portions of the musculature are numerous syncytial wandering cells. No intact villi are to be seen. Here and there are masses of blood-clot and small areas

¹ Demonstrated before the Philadelphia Obstetrical Society, November 5, and before the Pathological Society of Philadelphia, November 12, 1914.

of degeneration, and the central cavity has obviously arisen as a result of the hemorrhage and necrosis always associated with this tumor.

To sum up, we have here an example of a chorionepithelioma, occurring in a young woman about a year after a curetttement for supposed miscarriage, the material removed being suggestive of hydatid mole. The malignant uterine tumor pursued an atypical course, in so far as it was unassociated, in the latter months of its development, with its most characteristic symptom, external hemorrhage, and in that it comparatively early eroded through the serous coat, with resulting violent and very nearly fatal internal hemorrhage, but without involving in any way the uterine cavity or endometrium. Although the tumor was of comparatively small size, it is entirely possible that metastatic deposits may have already formed in distant organs, the tendency of this growth to rapid and extensive dissemination by means of the blood stream being, of course, well known. In view of this fact, and of the poor condition of the patient while on the table, we do not feel that any more extensive type of operation than was performed—for instance, a panhysterectomy, or the radical procedure of Wertheim—would have in any way offered a sufficiently increased chance of permanent cure to have justified the additional shock involved.

That intraperitoneal rupture of a uterine chorionepithelioma, with severe internal hemorrhage, has been already observed is shown by a few reports of such cases that have appeared from time to time in the literature; from their scarcity, however, it is evident that the condition must be an extremely unusual one.

A few years ago Hörmann² reported an interesting case in this connection. His patient was 38 years of age, VIII-para, and was admitted to the hospital after a period of irregular bleeding followed by amenorrhœa, under the diagnosis of extra-uterine pregnancy. On vaginal examination a soft, very tender mass was felt to one side of the uterus, this apparently confirming the diagnosis. Immediately following the examination the patient began to show signs of severe internal hemorrhage, and an emergency operation was performed. On opening the abdomen, considerable blood was found in the peritoneal cavity, and projecting from the right uterine cornu was a tumor mass the size of an orange; this was so firmly attached to several loops of intestine that a small bit of the tumor substance had to be cut away and left in the abdomen. A supravaginal hysterectomy, with removal of the major portion of the growth, was performed, the operator at the time considering the condition a ruptured interstitial pregnancy, and not suspecting its

² *Hegar's Beitr. z. Geb. u. Gyn.*, 1904, viii, 404.

FIG. 3.



Microscopic drawing (low power), showing active invasion of the uterine wall by syncytial masses and clumps of trophoblast cells.

malignant nature. On examining the extirpated uterus, however, practically the entire organ was found to be involved by a destructive, hemorrhagic tumor, which in several places threatened to perforate the serosa, and at one point had actually done so. Microscopically it proved to be a typical chorionepithelioma. The patient recovered, and left the hospital in apparent health, but died six weeks later with symptoms of a secondary growth in the intestines, which may probably have arisen from the bit of tumor not removed. No autopsy was performed.

In addition to this case, Hörmann was able to collect from the literature seven others of somewhat similar nature, the main points of these being as follows:

CASE 1.—Aczél.³ A woman, 22 years of age, primipara, died with symptoms suggestive of pulmonary tuberculosis. At autopsy a nodular tumor was found in the uterus, with an area of perforation in the fundus. There was some pus, but no blood, in the peritoneal cavity, and there had been no clinical symptoms of hemorrhage. Extensive metastases were found in the lungs, intestines, etc., all showing the characteristic microscopic picture of chorionepithelioma.

CASE 2.—Gottschall.⁴ The patient was 30 years of age, primipara. About two months after an apparent miscarriage she was suddenly seized with violent abdominal pains and rapidly-developing symptoms of internal hemorrhage. Immediate operation disclosed a mass of blood in the peritoneal cavity, and a somewhat enlarged uterus, with a good-sized perforation on the posterior wall near the fundus. From this exuded a bloody fluid with numerous small, bladder-like masses. A rapid hysterectomy was performed, but the patient died soon after leaving the table. Examination of the uterus showed the whole upper portion to have been destroyed by a large mass of typical hydatid mole, the microscopic sections showing distinct malignant proliferation of the chorionic epithelium.

CASE 3.—Jacubasch.⁵ The patient, 26 years of age, secundipara, had been bleeding for several months. Upon vaginal examination the uterus was found large and irregular, and a diagnosis of multiple myomata was made. Immediately following the examination the patient went into collapse, and died in a few hours without operation. At autopsy a quantity of blood was found in the abdominal cavity, and in the fundus of the uterus there was a tumor the size of an apple, surrounded by several smaller nodules. One of the latter had ruptured, and constituted the source of the hemorrhage. The author's diagnosis of the tumor in this case was "sarcoma telangiectodes hemorrhagicum multiplex uteri," but, in view of the date of the report, and of the clinical history and description of the specimen, Hörmann is undoubtedly right in classing it as an example of ruptured chorionepithelioma.

CASE 4.—Kaltenbach (1901). Following the development of a large hydatid mole, the patient died from an internal hemorrhage. At autopsy the uterus was found perforated in three places.

CASE 5.—Leopold (1885). The patient developed symptoms of internal hemorrhage, and at operation a subperitoneal nodule in the uterus was found to have ruptured. Hysterectomy was performed, followed by recovery, but the patient's subsequent fate is unknown.

³ *Monatschr. f. Geb. u. Gyn.*, 1896, iii, 413.

⁴ *Hegar's Beitr. z. Geb. u. Gyn.*, 1901, iv, 331.

⁵ *Ztschr. f. Geb. u. Gyn.*, 1881, vii, 64.

CASE 6.—Reinicke.* A woman, 26 years of age, primipara, was under medical treatment in a hospital for irregular uterine hemorrhage of several months' standing, when she was suddenly seized with violent abdominal pain and symptoms of internal hemorrhage. Immediate laparotomy showed the peritoneal cavity full of blood; the tubes were normal, but in the fundus uteri was a small opening, from which protruded a bit of dark, placenta-like tissue. A supravaginal hysterectomy was performed; the patient recovered, and was known to be well three months later. The author could not find microscopic evidence of chorionic epithelium, either syncytium or Langhan's cells, and therefore did not consider the tumor a chorioneplelioma, but classed it as, in all probability, a "sarcoma telangiectodes hemorrhagicum"; Hörmann, however, thinks it was undoubtedly what would now be classified as an "atypical," infiltrating form of chorioneplelioma.

CASE 7.—Zahn.[†] The patient was 43 years of age, V-para. On account of symptoms rather of intestinal obstruction than of internal hemorrhage the abdomen was opened; nothing of importance was discovered in the pelvis, but a portion of the right tube was resected, as the operator thought it appeared somewhat abnormal. The woman died an hour after operation, and at autopsy a small, clean-cut perforation was found in the fundus of the uterus, leading into the uterine cavity. In this region the endometrium was much thickened, and at the adjacent cornu there was a distinct vascular tumor, which the author diagnosed a "placental polyp," but which, from the description and drawings, was evidently a chorioneplelioma. There had been considerable intraperitoneal hemorrhage, with the formation of a retro-uterine hematoma,

Summarizing these seven cases, the one reported by Hörmann himself, and our own, we see that of nine patients in whom there occurred an intraperitoneal rupture of a tumor of chorionepleliomatous nature, three were not subjected to operation, and in a fourth laparotomy was performed, but the seat of the trouble was not discovered. All of these women died in a short time from intraperitoneal hemorrhage or infection. In the remaining five patients hysterectomy was performed, four of them recovering at least from the immediate effects of the operation; in one instance, in which the growth had been incompletely removed, death occurred in a few weeks, however, and the ultimate fate of the other three is unknown. This series of cases, small though it is, is sufficient to indicate the gravity of the condition, the great difficulty at times of making a correct diagnosis, and the importance of immediate operation in the presence of suggestive symptoms.

Our own case emphasizes one point in addition, however, which we consider of the utmost importance, and upon which too much stress

* *Arch. f. Gyn.*, 1897, liii, 105.

† *Virch. Arch.*, 1884, xcvi, 15.

cannot be laid; namely, the *potential danger of every case of hydatid mole*. This is, we believe, not sufficiently recognized by many practitioners and general surgeons. It is well known that chorionepithelioma is far more apt to develop after a molar pregnancy than after a normal gestation or ordinary miscarriage. It has been estimated that from 35 to 50 per cent. of all cases of chorionepithelioma have been preceded by a hydatid mole, and, conversely, the estimates of the proportion of hydatid moles followed by the subsequent development of a chorionepithelioma range from 7 or 8 to over 30 per cent. Even though the smaller figures may more nearly represent the general average, they are large enough to show the very serious potential danger of the condition, and to impress upon us the necessity for a competent *microscopic* examination of all material removed by curettage, or discharged spontaneously, in any way suggestive of hydatid mole. If such examination shows this condition to be in fact present, the importance of keeping the patient under frequent supervision should be vigorously impressed upon her family physician, and she herself should be warned of the importance of reporting *at once* any irregular or excessive bleeding or discharge. Had this been done in the case that we are here reporting, instead of time being wasted with medical treatment, a thorough curettage at least would have been performed when the patient first complained of the renewed irregular bleeding following the original operation, the material would have been carefully examined, and if it had shown any evidences of cellular-irregularity or of the presence of chorionic elements, immediate hysterectomy would have been insisted upon, and the young woman thereby very probably saved from the development of one of the most malignant types of tumor to which the human body is subject, which came within an ace of costing her her life from acute hemorrhage, and may yet do so from the occurrence of metastatic growths.

[NOTE.—Since the above was prepared for publication, the case here reported has presented the following rather interesting developments:

Upon the first attempt at coitus, three weeks after leaving the hospital, the patient was seized with most furious hemorrhage, which necessitated the tightest possible tamponade of the vagina to control it sufficiently for her to be brought in again. On removing the packing, two or three small, soft, papillary excrescences were found in the left vaginal vault. These were removed by the cautery, this procedure being again accompanied by violent hemorrhage, which it was impossible to control by extensive cauterization, so packing was again resorted to. Microscopic examination of the removed particles showed them to consist of

vaginal wall, with several areas of typical chorionepithelioma. On removing the packing the following day, another hemorrhage of such violence occurred as seriously to threaten the patient's life, and almost to lead to a suspicion that the iliac vessel had been eroded. This was, however, controlled by acetone gauze, left in place for forty-eight hours more. After the removal of this, there was slight oozing every day, especially after an examination. Soon a distinct mass began to develop in the left parametrium, which shortly reached the size of a large lemon, extended somewhat into the uterovesical space in front, and was immovably fixed to the pelvic wall.

As any hope of further benefit from operative measures seemed to be gone, the patient was referred to the University Hospital for radium treatment. On January 2, 1915, three tubes of radium, the quantity of whose contents we have been unable to ascertain, were placed in the vagina for 24 hours, following which the patient was allowed to return home. Since then she has been examined at weekly intervals, and has shown, so far at least, a truly remarkable improvement. The mass in the left parametrium has steadily shrunk in size, and become freely movable, the upper portion of the vagina has contracted somewhat, and the tissues have become firm and hard; since the radium application there has not been a drop of blood passed, and now even purposely rough manipulations during examination fail to elicit the least ooze. Two small bosses are still palpable projecting into the vaginal vault, but these are steadily shrinking. Following the radium treatment, the patient complained for a time of severe pains in the rectum, which suggested the possibility of beginning involvement of that organ, but these have now entirely disappeared, and were undoubtedly the result of irritation from the radium. Subjectively, the patient appears entirely well, and is able to lead a perfectly normal life in every way.

Of course, nothing is farther from our purpose than to suggest that an actual cure has been attained here. Only the future can determine that. It seems reasonable to hope, however, in view of what is known of the local destructive action of radium on malignant growths, that if no deep-seated metastases have as yet occurred, sufficient destruction of the tumor may be caused by the radium to permit the natural protective powers of the body to get the upper hand. At the present writing (February 1, 1915) all we can say is that a degree of improvement has followed the treatment such as we believe could have been attained in no other way, even granting the well-known ability of the body at times to overcome this type of growth unaided. Here, however, progression was steadily from bad to worse until the radium application, since which the picture has completely changed. One or more further treatments will probably be given in the near future, according to the progress of the case.]

Medical Problems

MEDICAL ECONOMICS

BY JOHN ASHBURTON CUTTER, M.D.

Secretary of the West Side Physicians' Economic League, New York City

THE first Saturday in March, 1886, the writer boarded a downtown car, moved over worn-out rails by a horse and managed by a compound of driver and conductor in one person, arrived close to the City Hall Park, entered the County Clerk's office, passed in his diploma, of date of a few days before, and was registered as a practitioner of medicine and surgery. Last March he took over the office of secretary to the West Side Physicians' Economic League, and since then has been engaged in more active clerical administrative work than in many years and finds himself associated with men as old, if not older, in a strenuous effort to find some kind of solvent of the economic problems affecting the medical profession.

Here are some of the present-day conditions:

FIRST.—The horse-propelled car is replaced by the application of electricity above, below, and on the surface of the earth. And with this great change have come many others, and among them we find our universities and colleges turning loose annually literally a horde of degreed students, many of whom are going to find a livelihood by working on the problems of regulation before the fact, as if old humanity had not always reeled and staggered along, and can be managed before the fact to only a very limited extent. But the effort is here, and these young people are so filled with their academic vanities that they think they can tell medical men how to practise medicine.

SECOND.—*Medical Individualism:* Lawyers largely make the laws and execute them, and team-work in the legal profession is highly efficient. The medical man is a hermit; he has friends, yes, and good ones in the profession, but our ideals have been and are so eminently placed that to think of working together financially is to cause a mental cataclysm in the thinker.

THIRD.—The decrease in acute diseases is wholly due to the initiative of the medical man, and of it he does not complain, but gives thanks that his own family is less liable to infection and sickness.

FOURTH.—The dispensary and clinical service of the medical men in this city literally means giving to the poor and those not poor millions of dollars annually of unremunerated service. Settlement workers under salary from philanthropists look on with amazement at such altruism. And among other results we find the promotion of pauperization, excessive tiring of the men engaged in this work, and at times their overcharging those who do pay.

FIFTH.—The Health Department in its night clinics, free vaccinations of the children of the well-to-do, and its visiting nurses infringing on medical practice, yet further promotes the idea among thousands that medical services are to be had freely and without cost.

SIXTH.—Medical men have not been blameless—they have chased the man with a dollar, which is one hundred cents and may be half his day's wages, to the clinic, dispensary, or Health Department, and with him have gone many who can pay two and more dollars, to say nothing of his company of thousands who pay only the dollar. The managers of clinics desire large records at the end of the year for publication, whereby more money will be subscribed by people, some of whom have had their arms up to the shoulders in the financial bowels of humanity and who wish to ease their conscience and fatten their self-esteem. And thus the system grows, and the common garden variety of medical men, on whom, in the final analysis, the health of the people rests, suffers from overwork and underpay and is not at his best for his legitimate labor.

SEVENTH.—Mutual piracies are seen—the man on top, called in as consultant or operator, may get enormous fees and leave the attending physician with little or nothing. On the other hand, the financially astute general practitioner, desiring to get even, as he thinks, with the specialist, sends his patients to the clinic and literally hangs round to see what diagnosis and treatment are made and ordered. What a state of affairs in the noblest of professions!

EIGHTH.—Fee-splitting is loudly inveighed against, though naturally arising because the general practitioner has not seen to his getting a proper fee for diagnosis when calling in the operator, and the latter has not always been thoughtful enough to look after the

interests of his more humble, though as valuable, social servant, the general practitioner.

NINTH.—Muckraking in and out of the profession has not done it much good, but, instead, much harm; the thoughtless and malicious among the laity draw upon such muckraking with avidity and use it to the damage of the medical man.

TENTH.—The worship of the Golden Calf, now diminishing with the present parlous financial condition of the country, had led medical men to live beyond their means and had bred in the minds of many of the people that the only criterion of a medical man's ability was the size of his automobile and the furnishings of his office.

ELEVENTH.—Chronic diseases have always been largely neglected by the profession—yet the procession of such towards the grave contains so many hundreds of thousands that here is a field for earnest, persistent, toilful endeavor on the part of the medical man, which will bring him a decent, but not princely, income.

TWELFTH.—General medicine and the specialties—the last thirty years have seen a most wonderful development of the latter—what the sum-total of good to the human race of this intensive work is, naturally no man knows. It has drawn many men, young and old, unto itself and has increased the cost of medical service to the man who pays. In the writer's opinion, there will be slowly but surely an unconscious adjustment of things, without the slightest organized effort on the part of medical men or laymen, which will mean a considerable return to the days of the general practitioner. The conclusive knowledge obtained by specialists will be correlated and conserved, and the general man will be able to use much of it to the advantage of his clientèle—while specialism will not cease, but undoubtedly there will be fewer in same, and those achieving prominence will be remunerated better than ever.

In closing, reforms of abuses in hospital, dispensary, clinic, and Health Department work will be accomplished only after serious concerted study and action. Feuds between medical men will cease when they get together in a meeting not devoted to the demonstration and explication of rare medical experiences, but to the very human business of managing the sick properly, of getting a living income from such work, and of preventing the worst of things in the body politic, the promotion of pauperization, which means—wrestle not for existence, but get something free from the State and cease to grow.

Progress of Medicine

During the Year 1914¹

BY HENRY W. CATTELL, A.M., M.D.; EDWARD WILLARD
WATSON, M.D.; AND SAMUEL M. WILSON, M.D.

Philadelphia

EFFECT OF THE WORLD-WAR ON THE PROGRESS OF MEDICINE

WHAT will be the ultimate effect of the war on medical progress no prophet can at this stage foretell. Much depends on the war's duration, much on the way in which chance, fate, or, if one takes the religious view, Providence distributes rifle-bullets, shrapnel, war-missiles, and diseases. Whom they strike or spare is of the utmost importance, for disaster may cut off the very men who, if they lived, might be great discoverers. In Germany and France, where service in the armies makes no discrimination, the results in this respect may be most unfortunate. Imagine battle relentlessly destroying in their youth Lister, Edison, Pasteur, Marconi, Koch, and a host of other men who have advanced the knowledge and resources of humanity. Can we suppose that their loss would, in some mysterious way, have been supplied by other men?

Some branches of medical science will undoubtedly be stimulated, some even overstimulated. Certain rules of hygiene will be forced upon nations on a scale heretofore undreamed of, as the stopping of the sale to syphilitic Russia of its national alcoholic drink, vodka, formerly a governmental monopoly. The surgery and after-treatment of wounds will be advanced, while the freer and more definitely defined use of serums and vaccines to combat tetanus, gangrene, typhoid, and camp diseases in general, the study of deafness, blindness,

¹ The review covers the period from February 1, 1914, to February 1, 1915, and is incomplete in so far as certain topics of live interest to the medical profession are not here touched upon owing to their having been gone over recently by the insertion of original articles covering this ground during the publication of the Twenty-Fourth Series of the INTERNATIONAL CLINICS, or to the fact that papers on these subjects will appear in the forthcoming volumes of this quarterly during 1915.

and insanity produced by war on a gigantic scale, will be literally forced on the medical world; and a multitude of cases as well of prolonged collapse and malnutrition, with terror and despair as adjuvants, as in Belgium, Poland, and wherever elsewhere the wreck of war may spread its ravages—all these, with the loss of valuable scientific workers and properly-equipped laboratories in many lands, will of necessity put a new face on the medical aspect of the world.

Abroad there is no possibility of quiet and exhaustive study just now, and the non-militant population must often suffer from neglect caused by the actual scarcity of physicians. The very imminent need of the multitude of wounded and sick soldiers will divert attention and effort from the every-day diseases of the home population. New conditions of injury and exposure in armies will create new aspects and conditions of disease. Epidemics will be intensified by squalor, deprivation, overcrowding, neglect, and despair, and all these will attract and absorb the attention of the medical workers. In despite of the hurry and necessary confusion of field hospitals, great discoveries may be expected in surgery, and the opportunity of testing laboratory remedies on vast numbers of men cannot fail to lead to invaluable statistics, and methods of treatment based on more certainty than ever before. But contending against the peril and confusion of field-service, the overwork, the surroundings, always bad, that influence results, he will surely be a wonderful man whose records have been carefully and accurately kept amid hurry and danger. In fact, after it is all over, whenever that may be, the surviving surgeons are more likely to look back upon it all as a bad dream, that came in a night, than to produce really valuable records. It is, after all, nobler to be useful to-day than to publish volumes of records tomorrow.

We may also, if the war continues long, look for epidemics which, starting on the battlefield and in the trenches and among innocent inhabitants driven from their homes by the relentless cruelty of war, may spread to neutral lands and peaceful communities, massed diseases always tending to become more virulent. Taken all together, the prospect for the coming years is by no means bright. In the lands at war where before its outbreak laws were already passed, or about to be passed, to improve the condition of the masses of the population, where old-age pensions, work and support for the unemployed, State

medical aid for the workers, in short, governmental insurance against many of the ills of life, were being put into operation, governmental poverty, with the sudden demand for the relief and support of an immense number of the disabled thrust upon it, with huge taxes necessarily caused by war, must, for a time at least, put a stop to these progressive movements. Humanity must yield to necessity, and the world be harder and worse, for the fallacy of war being a stimulant, a tonic, a means of reformation and improvement for nations will be completely disproved, and again, as so often before in the history of the ages, man, just reaching out to grasp the hope and fruition of peace, brotherhood, happiness, will thrust himself back into the same hopeless misery, being, as ever, his own destroyer, no angel with a flaming sword being needed, for man's own sword will ever bar the way to the paradise of a world at peace.

We frequently show our appreciation of the progress in everything now taking place by expressing the wish that we might return to our present surroundings after an interval, usually of, say, a hundred years. Leaving out of the question that it is by some philosophers believed that we shall so return, to pass again and again through a life cycle, we probably little realize that we would be totally unfitted to take any part in the life of that future day unless we had gradually grown up in it. Twenty years ago diphtheria was the only disease for which we had an antitoxin, and it was regarded as of very doubtful value and as of dubious safety. Its use in that disease is now regarded as an imperative duty. Moreover, we now have remedies of a related character for many other diseases, differing, however, in characteristics in so many ways that it is hard to keep in thorough touch with them, and, what is of equal importance, to understand when to select a given one—when to use it and how, and also when to stop again. What is true in this respect in matters medical applies with equal force, though, of course, in a different manner, in every walk of life. The "Tango" is not the waltz, the modern concrete building differs greatly from the old brick one, the telegraph is not the same as the modern wireless, a battleship is out of date a few years after it is launched—sometimes, so it is said, before that event—and, altogether, a man of affairs of twenty years ago who should now come back, as some of them now occasionally do, would find himself very thoroughly out of his place and element.

THE HARRISON ANTI-NARCOTIC LAW

With this issue of the CLINICS the Harrison Anti-narcotic law goes into effect. After full hearing of all interests involved, amendment and attempted amendment, this, the third Harrison bill, was passed finally on December 10, 1914, and signed by President Wilson, December 18, 1914.

Drawn as an internal revenue measure and carrying a special tax feature, the question of States' rights is avoided, and it applies to all persons having to do with the distribution of opium or coca leaves, their salts, derivatives, or preparations. Of course, this includes all physicians. Certain exemptions apply, inclusive of employees of physicians.

Physicians will be obliged to take out a license costing one dollar from the internal revenue authorities, receiving certain order blanks. A physician may not purchase any of the interdicted substances except upon the presentation to the person or firm from whom he purchases one of these blanks properly filled. A licensed physician may prescribe or dispense these agents without additional record to persons upon whom he is in actual attendance, but he must keep a written record of any other distribution of these drugs. Internal revenue collectors of any district may have free access to physicians' records of purchases and distribution.—(*Medical Council*, February, 1915.)

The Journal of the American Medical Association, December 26, 1914, printed the following very clear abstract of the law:

The title of the act is "An act to provide for the registration of, with collectors of internal revenue, and to impose a special tax upon all persons who produce, import, manufacture, compound, deal in, dispense, sell, distribute or give away, opium or coca leaves, their salts, derivatives, or preparations, and for other purposes."

Section 1 provides that after March 1, 1915, every person who performs any of the acts mentioned in the title shall register with the collector of internal revenue of the district his name and place of business, and shall pay a special tax of one dollar a year. Employees of registered persons, officers of the United States Government, lawfully engaged in purchasing the drugs named for the army, navy, public health service, or government hospitals and prisons are exempt. Only registered persons shall be permitted to perform any of the acts mentioned in the title. The term "person" is expressly defined to include partnerships, associations, companies or corporations.

Section 2 provides that no person shall sell, barter, exchange, or give away any of the drugs mentioned except on a written order on a form issued by the Commissioner of Internal Revenue and supplied only to registered persons. Such

orders shall be issued in duplicate, the original to be preserved by the person filling the order and the duplicate to be preserved by the person issuing it, for a period of two years, and kept so as to be accessible to inspection by any officer of the Treasury Department or of State, territorial, district, and municipal officers. The exemptions under this section were the subject of the most prolonged discussion. As the bill finally passed, it provides that this section shall not apply to the dispensing or distribution of any of the drugs named to a patient by a physician, dentist, or veterinary surgeon registered under the act in the course of his professional practice, provided that the physician, dentist, or veterinary surgeon shall keep a record of all such drugs dispensed or distributed, showing the amount, the date, and the name and address of the patient, except such as may be dispensed, or distributed to a patient on whom such physician, dentist, or veterinary surgeon shall personally attend. This record is to be kept for a period of two years, subject to inspection. The sale of any of the drugs mentioned, on a written prescription issued by a physician, dentist, or veterinary surgeon, is also exempt, but the person filling the prescription is required to keep the prescription on file for a period of two years. The sale of drugs to foreign countries is exempt, subject to the regulations of the country importing them, as is also the sale of drugs to any properly authorized government officer or State, territorial, district, county, or municipal official purchasing supplies for a public hospital or prison.

The Commissioner of Revenue is authorized to prepare suitable blanks to be sold to dealers, the price not to exceed one dollar per hundred, and the name of the purchaser using the blank is to be written or stamped on it by the Collector of Internal Revenue. No other persons are permitted to use the forms. Special provisions are made for the administration of the act in Porto Rico, the Philippine Islands, and the Canal Zone.

Section 3 provides that all persons registered under the provisions of the act shall, whenever required to do so by the collector of the district, make a full and correct statement on oath of the quantity of the drugs he has received and the names of the person from whom he has received them.

Section 4 prohibits any except registered persons from shipping or delivering any of the drugs mentioned in interstate commerce. Common carriers and employees are exempt.

Section 5 provides that duplicate orders and prescriptions shall be open to the inspection of all authorized agents of the Treasury Department and officers of any State, territory, or municipality. Certified copies of such statements can be secured on the payment of a suitable fee. No persons are permitted to disclose the information contained in the returns except in the matter designated above. Copies of the names of all persons listed in any district may be secured on payment of one dollar for each one hundred names.

Section 6 provides that the act shall not apply to preparations or remedies which do not contain more than 2 grains of opium or more than $\frac{1}{4}$ grain of morphine or more than $\frac{1}{8}$ grain of heroin or more than 1 grain of codeine to the fluidounce, or, in the case of solid preparations, to the avoirdupois ounce or to preparations for external use only, or to decocainized coca leaves or other preparations of coca leaves which do not contain cocaine.

Section 7 provides that all existing laws for the collection of internal revenue taxes are to be applied to the special taxes imposed by this act.

Section 8 provides that the possession of any of the drugs mentioned on the

part of any unregistered person shall be regarded as presumptive evidence of the violation of the law. Employees of registered persons, nurses under the supervision of registered physicians, physicians themselves registered under the act, proper officials, warehouse men holding possession of goods for registered persons, and common carriers transporting such goods are exempt.

Section 9 provides a penalty of not more than \$2000 fine or imprisonment for not more than five years or both for violations of the act.

Section 10 authorizes the Commissioner of Internal Revenue to appoint such persons as may be necessary to carry out the provisions of the act.

Section 11 appropriates \$150,000 to make the act effective, and Section 12 provides that this act shall not be regarded as modifying the national Food and Drugs Act or the act of 1909, prohibiting the importation of opium.

MEDICAL EDUCATION

The William H. Welch Endowment at Johns Hopkins University.

—In July last securities valued at \$1,500,000 were given by the General Education Board to the Medical School of Johns Hopkins University, the gift to be known as the William H. Welch Endowment for Clinical Education and Research, on condition that the entire income from this fund be utilized for the support of full-time teaching and research in medicine, surgery, and paediatrics. The professors hold their posts by becoming salaried university officials, and accept no fee for services rendered, even in private consultation. Patients of the usual private type pay a reasonable fee to the University instead of to the professor. The salary is, or is supposed to be, large enough to compensate for loss of private practice and to provide first-class assistants, laboratories, books, etc. Under similar conditions \$750,000 has also been given to the Medical Department of Washington University, and \$500,000 to Yale, for a thorough study of the sick. Thus again the hospital, originally intended for the poor, will become the haven of the rich when in need of medical attention, and the rank and file, both physician and laity, will not find their present lot correspondingly ameliorated.

Sir William Osler considers it somewhat attractive to think of "Super-clinicians, not bothered with consulting practice," whose whole interest will be in scientific work, but "the plan has not yet had a practical trial." There is the danger of handing general practitioners in embryo to a group of teachers out of touch with the conditions under which such will have to live. Then, will it be best "to keep our best in clinical seclusion"? Is there not the danger of the evolution of "a set of clinical prigs, the boundary of whose horizon

would be the laboratory and their only human interest, research? I say, frankly, I am not in favor of whole-time clinicians."

With regard to the carrying out of this new and important experiment, it means, says Dr. John B. Murphy, that the number of doctors permitted to develop in the services will be fewer. Men have not valued their opportunities and have not been conscientious in rendering individualization service to each case. Institutions are going to hire doctors as they hire accountants. It is time we were waking up. A new type of practice is evolving: diagnosis cannot be conducted on a wholesale plan, but must be based on symptoms and signs, on physical and laboratory findings. The patient is entitled to the result of knowledge, perception, painstaking care and interpretation of clinical history. There is laxity in detail. Think of those patients in the New York Dispensary who never had their coats unbuttoned. But the full-time system there means that only four or five instead of some thirty men will be educated to practise medicine through the dispensary school of experience.

Medical Research Reports.—Abraham Flexner's report on medical education in Europe: The report of the Royal Commission on University Education in London and Sir William Osler's various pronouncements all show the medical world alive to the necessity for scientific research. But the chief factor for success is finding the right man, and, the man found, research should be a career in itself, not an apprenticeship for junior members of the profession who, when in practice, must act quickly, whereas the researcher must deliberate, reject, retrace.

Protection of Medical Research by Patent.—In the work done by the John Howard McFadden Research Fund, Mr. McFadden found some of the results were being utilized commercially, whereas the donor desired that these should be used gratis for the public good.

It was decided by the Comptroller-General of the Patent Office that, should the specification be accepted, the patentee may purposely omit to pay the fee, when the invention will be published, and publication can be cited against any subsequent specifications sent by other persons in connection with the process. This decision might be useful in preventing plagiarism.

The Endowment of Medical Research.—Good work is being done by the George Williams Hooper Foundation for Medical Research, for

which Mrs. Hooper left over a million dollars. Dr. George H. Whipple, M.D., professor of pathology in Johns Hopkins Hospital, is the present director.

In addition to a fund of \$1,000,000 for the establishment of a department of animal pathology at the Rockefeller Institute, Mr. Rockefeller has given \$2,550,000 to buy land in New York City adjoining the present building, whereon to erect, equip, and maintain additional laboratories. Animal industry will be greatly aided, as special attention is to be given to hog cholera, foot-and-mouth disease, poultry disease, etc.

Medical Requirement to Practise.—Instead of 160 medical colleges, there are now about 100, and 82 colleges now demand for admission one or more years of collegiate work. In 1904 the laws of only 20 States made provision for preliminary education; now 45 States have definite standards and require a high-school or higher education.—(*N. Y. Med. Jour.*, June 27, 1914, p. 1302.) Under the new regulations in Pennsylvania, a year's experience in a hospital under competent direction is obligatory before a graduate can practise medicine in this State, and the entrance requirements have been raised.

The total number of medical students (matriculated) in the United States for the year ending June, 1914, excluding premedical, special, and postgraduate, was 16,502, a decrease of 513 from the former year. Of this number, 15,438 were at the regular colleges, 794 at the homœopathic, and 270 at the eclectic. Six hundred and thirteen women were studying medicine, a decrease of nine since the last year. There are still 18 cities with two or more medical schools, 85 having gone out of existence since 1904. The effect of higher requirements has resulted in larger enrolments at those which do not demand them. The House of Delegates of the American Medical Association adopted in June, 1912, a report instructing the Council of Medical Education to omit from the suitable list any college which, after June, 1914, does not require for admission at least one year in addition to the four to be given to higher-grade scientific work, and the Association of American Medical Colleges has adopted the same procedure.

The Royal College of Surgeons, Edinburgh, has decided to admit the Imperial University of Japan and Bristol University graduates who may present themselves for the College Fellowship without their first becoming members.

Another decree from Edinburgh (to aid Colonials) is that the South African College, Cape Town, is recognized as a school of anatomy and physiology for admission to the second examination at the Royal College of Physicians and Surgeons.—(*Lancet*, Aug. 22, 1914, p. 520.)

A State Medical Service.—The coördination of public health services seems to be inevitable in England, but it would perhaps mean regular hours and holidays, more time for study, independence of the general public, and a pension. Dr. H. H. Mills holds a contrary view to that of Sir John Collie. He foresees the State doctor with no outlook save a number of years at a fixed salary with a pension, which routine would tend to make work mechanical and atrophy mental and professional activities. M. R. Rhodes also objected that in a State service the medical profession would become the servant of the community and not of the individual patient—the household teacher, as he should be, of preventive medicine and treatment. E. B. Turner thought that if promotion were by nomination the door would be opened to political favoritism; if by the ordinary routine of government office, the man who gave least trouble to superiors would come to the top.

Recognition of Medical Skill.—A monument will be raised on the Canal Zone to the memory of those who have done most in preventive medicine and sanitary science.

DEPARTMENT OF PUBLIC HEALTH

Nearly every State, county, and city medical society in the United States has endorsed legislation for the creation of a Department of Public Health, with a cabinet officer at the head. Millions are spent every year in stamping out diseases which could have been headed off by experts. The work of Gorgas on the Panama, the eradication of plague from San Francisco by Blue, of yellow fever from New Orleans by White, the work of Stiles on hook-worm, Anderson and Rosenau on anaphylaxis, Lumsden on typhoid fever, Lavender on pellagra, von Erdorf and Carter on malaria, Rucker, Creel, and Grubbs on plague, and Young, Goldenberger, Trask, and other surgeons show what can be done.

We want a Department of Health on the same basis as the Departments of the Army and Navy, and it would be well for it to

correlate with the medical corps of the two services during times of peace. New Orleans spent about \$50,000 per month this year in salaries for plague prevention, when the work could probably be better done at one-fifth the cost if the United States marine and land forces were trained in sanitary work. Moreover, in war, disease kills more than ammunition, and the men so trained could then save thousands.

The government owes to Gorgas greater public recognition, and to make him a major-general should first be done, that he may retire with that rank. Then the creation of a Department of Health, with Gorgas as Secretary of Health, would discharge a national and public debt.

Minister of Public Health.—Medical men of the United Kingdom, like those of the United States, are anxious to have a Minister of Public Health, particularly with regard to vital statistics, for at present the Board of Health makes no provision for payment of practitioners doing State work, and stillbirths are not under compulsory registration, which hinders a consideration of prenatal conditions.—(*Lancet*, Aug. 15, 1914, p. 449.)

The Public Health Service.—This body is certainly doing good work in investigating river pollution, studying trachoma in the Kentucky mountains, pellagra in South Carolina, and the spread of typhoid generally. The Hygienic Laboratory at Washington, in addition to its examination of vaccines and serums, has done valuable research work, and the National Committee for Mental Hygiene has given great aid in procuring uniformity of legislation for the insane.—(*N. Y. Med. Jour.*, June 27, 1914, p. 1274.)

A school for public health officers is now instituted by Harvard University and the Massachusetts Institute of Technology, acting in coöperation through an administrative board. It is significant of the spirit of the school that this board consists of a doctor of science, of medicine, and a civil engineer. A certificate in public health (C. P. H.) is granted to successful students, and women students are admitted.

VITAL STATISTICS

At the Section of State Medicine of the British Medical Association Sir Victor Horsley and others were decidedly in favor of a system of international statistics, and resolved to appeal to the govern-

ment for the immediate institution of a confidential system of death certification, putting it in the hands of the medical officers of health, who will be in close touch with medical practitioners, and so make it easier to deal with cases having a possible criminal aspect.—(*Brit. Med. Jour.*, Nov. 7, 1914.)

Medical practitioners and even obstetrical experts are not yet very learned on the pathology of the "products of conception," while scientific examination of abortions and stillbirths is made in very few hospitals. Sir Amand Routh would like to see an antenatal research laboratory in every hospital with an obstetric pathologist. The undecided transmission of disease from mother to child through the placenta would be answered, and, later, when chemical pathology takes its proper place, the origin of placental and fetal toxæmias determined.

CONFIDENTIAL DEATH CERTIFICATES

A proposition has been made in England to have two death certificates furnished by the medical attendant, one of these, as at present, to be for public inspection, the other to give the true cause of death. That these would in many instances differ admits of no question, and that it would be for the public welfare, as well as the advancement of medical knowledge, is evident. A still better provision, and one that must eventually come, would be that all bodies must be opened post-mortem before burial. Many of us in private practice could honestly say that we personally know of cases in which we had reasonable grounds to suspect that murder had been committed, but could not hope to prove it. A co-heir in an estate fails to recover from a very moderate illness; an elderly, no longer useful member of a family fails to awake some morning; a sufferer from a lingering illness, without warning, dies.

MEDICAL ETHICS

Publicity Committees.—During the year many hot discussions have been held concerning the right of the public press to publish that which is interesting in the medical world for the general public, and the effect it has to make the doctor a voluntary or involuntary self-advertiser. This occurred notably when sensational reports concerning radium and its possibilities were the subject of medical or

public lectures. Doctors often had to resign themselves to an "interview" as the lesser of two evils, for otherwise the reporter would assuredly give an account of one, purely fictitious, and, if kept out of a meeting, would concoct one from popular science books and doormat conversations with the janitor.

It has, therefore, very wisely been decided that the rampant reporter should be given certain facts concerning medical research, condition of noted patients, etc., rather than be left to the play of his imagination. The American Medical Association recommends that each county society should constitute a Publicity Committee, which shall give the daily press accurate information on all medical matters of interest to the public; that this shall be freely given, without the mentioning of names or from whence the information comes, and the committee shall act in an advisory capacity to physicians relating to publications other than in the medical press.

Shall the Doctor Tell the Truth?—The common-sense answer, according to Julian W. Brandes (*Outlook*, Aug., 1914, p. 861), seems to be a negative one. He argues that the mere term "heart" in connection with symptoms often gives more suffering to a patient than the disease itself: chronic invalids are often formed by being gravely advised to "avoid exertion," and the mere mention of "cancer" has shortened life and, mentally, increased physical suffering, even led to suicide. The decision seems to be that a rare few may safely be told, but dissimulation is best with the majority.

Taxation of Doctors.—The physicians of Virginia have won the right of freedom from taxation, a rule which will come into effect in 1915.—(*J. A. M. A.*, April 18, 1914, p. 1259.)

DENTAL INTERNS FOR GENERAL HOSPITALS

Modern medicine recognizes the need of skilled care of the mouth and the frequent need of the attention of a dentist, therefore in Bellevue Hospital, since 1901, there has been a dental service, and more recently it has been established in some other hospitals. The results have been excellent, but two factors render difficult the establishment of such a department: First, unless the dental staff receives precisely the recognition accorded the surgical and medical members, men of good class will not serve, unless for salary, and the officials having to decide such questions have shown a reluctance to

take either of these steps. The question whether both a salary and the social recognition should be accorded is an open one, but the benefit arising from the dental clinic is beyond question.—Herbert L. Wheeler (*Jour. Amer. Med. Assn.*, Jan. 30, 1915).

WORKMEN'S COMPENSATION ACT

The United States Bureau of Labor, Bulletin No. 78, 1914, estimates the total mortality from accidents in the United States among adult wage earners to be between 30,000 and 35,000 only, the non-fatal, half of which occur in industrial establishments, some 2,000,000 each year. Forty-one foreign countries (including all European countries, save Turkey) and twenty-three States in America have workmen's compensation, and rules of all concerning medical aid are, generally, a constant source of friction. In the United States each one has its own decrees concerning medical fees and hospital sojournment. The compensation acts, when not properly administered, have many vicious points: the contract practice, at fees much less than those of the profession in the locality; hospitals taking patients on the dollar-a-month plan; when workmen pay for service to clubs or medical funds, to contract for this work, and the general profession be left out of consideration at time of accident; discord in the practice of medicine in localities where men are not "on the square" as to their professional work, or where members of county societies or units do not respect the rules of their organization.

The real objection as presented to the law in most States is the inelasticity of the fee bill, and there is nothing in the compensation laws to prevent a patient from suing the surgeon for alleged malpractice.

SOCIAL INSURANCE AND THE MEDICAL PROFESSION

The question of insurance for protection against sickness and accidents is a vital one, and one that has been recognized in almost all of the civilized countries of the world. Compulsory insurance against invalidism and old age has been instituted in some. It is, from a financial standpoint, a very desirable institution for both physician and surgeon. To both it means that a large proportion of the patients, formerly crowding dispensaries and hospitals, will be seen at their own homes and pay for their treatment. The question

by no means ends there, however. It goes still further and leads to improved hygienic surroundings and far-reaching betterment of living conditions.—I. M. Rubinow, M.D., Ph.D. (*Jour. Amer. Med. Assn.*, Jan. 30, 1915).

TELEGRAPHIST'S CRAMP

In England 4.4 per cent. of government telegraphists suffer from cramp (*Lancet*, September 5, 1914, p. 670), necessitating large compensatory sums of money. Dr. A. W. Robertson discards the idea of a central lesion, and gives that of a chronic fibrositis of the connective tissues between the bundles of nerve-cells in the overworked area, the toxæmia having got in its work at the point of overstrain or injury or prolonged fatigue. He urges the examination of such cases for intestinal stasis or dental sepsis of the streptococcal variety so soon as the first signs of numbness are reported.

PREMATURE BURIAL

The fear of being buried alive still haunts the unlearned laity, who foster such belief on gruesome stories. D'Halluin (*Presse Méd.*, Aug. 12, 1914) gives a never-failing test, which is to place the person in a horizontal position and inject ether into one eye. If there is still life, the eye reddens. Only one eye should be treated, the other being left for control. With the cardio-puncture test he has had both useful and bad results, and Icard's subcutaneous fluorescein test, though considered a standard one, is not absolutely reliable, for various specimens of fluorescein may vary in action or be contaminated.

POST-MORTEM DISSECTION

Japan gave way to advanced views, and in 1904 permitted dissection, but China comes into line just ten years later, and the new Tutuh at Wuchang gave his consent in February, 1914.—(*J. A. M. A.*, Feb. 28, 1914, p. 721.)

MILK SUPPLY

It is not enough to swat the flies which torment cattle; the thing is to find a repellent, for, owing to investigations undertaken by the Government Bureau of Animal Industry, it is found that the irritation they cause, the blood they abstract, the movements they cause

animals to make in fighting them, and their unfavorable influence on the temper of dairy cows, bring large financial loss on the farmers and stockmen. They show reduced vitality, lack of growth, and the milk is often cut down to one-half. The United States Department of Agriculture has issued a series of repellents in its Bulletin No. 131, 1914.

Experiments carried on at the Thompson Yates Laboratories, Liverpool, in sterilizing milk by electricity resulted in a supply of milk entirely free from pathogenic organisms and retaining its full nutritive value.—(*Lancet*, May 9, 1914, p. 1338.)

MEAT INSPECTION

In 1913 the port sanitary authorities at Liverpool were notified by the inspectors that indications of disease had been found in frozen tongues from South America. The researches of J. M. Beattie and D. M. Alexander, bacteriologists, on 147,501 tongues (the importation during two months) showed 3809, or 2.5 per cent., to be diseased, the condition being mainly due to actinomycosis, though in some tuberculous glands were found, inoculation from which was followed by tubercle infection in experimental animals. Actinomycosis rarely affects man, but it is advisable to reject any diseased meat, and, of course, that tainted with tubercles is condemned beforehand.—(*Lancet*, Aug. 22, 1914, p. 513.)

The new regulations issued in July and which became effective in November, 1914, enjoin that detection of disease shall be made ante-mortem if possible, and suspected animals to be marked "U. S. suspect" and slaughtered in a separate compartment. Establishments violating laws will be denied inspection and, *ergo*, incur disability to ship any meat. No raw muscle tissue of pork is allowed as ingredient of any article of food which is eaten without cooking, unless it has been subjected to a temperature sufficient to destroy all live trichinae.

EFFECTS OF THE PURE FOOD LAW

And this is what the Government has done for the foods and medicines of America. We quote from a label on a tube of pie-filling and in a circular recently sent us by an enterprising manufacturer of drugs which are to be sold to the laity:

"Pie-Filler—Lemon Flavor: Compounded from granulated sugar, corn syrup, egg, lemon flavor, cereal, water, fat, citric acid, preserved with $\frac{1}{4}$ oz of 1 per cent. sodium benzoate, artificially colored. Coloring used is guaranteed U. S. certified."

DEAR DOCTOR:

The United States Government has recently given to _____ (a combination of port, olive oil, and tincture citro chloride of iron) a unique recognition by recording it as a *Medicinal Preparation*, so that it can be supplied by any drug store, instead of its sale being limited to drug stores with a liquor license, the principal ingredients of which are the oldest fruit products known to man—grapes and olives.

Wine, oil, and iron combinations of this character have hitherto been excluded from this class, because of the desire of the United States Internal Revenue Department office to protect the people from the exploitation of preparations containing inferior or adulterated wines and impure oil. The admission of _____ has practically established it as the Government's standard of quality.

Each 25-ounce bottle of _____ contains 18 $\frac{1}{2}$ ounces pure port wine, made from the very best selected grapes grown on the heavily impregnated iron soil of _____, by wine makers of more than half a century's experience; 6 ounces pure virgin olive oil of the highest grade, every shipment being analyzed by the United States Government, and $\frac{1}{4}$ ounce tincture citro chloride of iron, U. S. P. standard.

It would be out of place for us to discuss the therapeutic values of olive oil, iron, and port wine. In _____ we offer you the purest quality with the endorsement of the United States Government.

WATER SUPPLY TO SHIPS

There have been many cases of typhoid on ships in New York harbor, and the supposed potable water was shown to contain decomposed organic matter, also *Bacillus coli* and *B. pyocyanus*, and the outbreaks of typhoid in the French fleet were mainly due to contaminated water used in harbors, particularly at Cherbourg (*U. S. Naval Med. Bull.*, July, 1914). Investigations concerning the Great Lakes vessels show that during the summer of 1913 there were 300 cases of diarrhoea and 52 of typhoid, with 7 deaths.

EUGENICS

The progress of the eugenic movement, both in the realm of practice and science, is evinced in the increasing number of eugenist societies and the monthly output of literature.

But medical men all over the world deny the supposed benefit to accrue by registering venereal disease or requiring a health certificate before marriage. It does not seem likely that young men and

women will be carried away to any extent by a higher sense of duty toward remote posterity, and the only way to notification of venereal disease is to convince the public that it may be innocently acquired. The report of the Committee to Study and Report on the Best Practical Means of Cutting Off the Defective Germ Plasm in the American Population, New York, 1914, appears to cover the whole scope of negative eugenics. The remedies proposed were life segregation, sterilization, restrictive marriage laws and customs, eugenical education of the public and prospective marriage mates, systems of matings purporting to remove defective traits, general environmental betterment, polygamy, euthanasia, neomalthusianism, *laissez faire*.

Denmark, Norway, and Sweden are drifting slowly to legal interference in matters relating to race betterment. Bills are to be introduced concerning marriage and divorce, one clause of which says that "Sufferers from venereal disease in an infectious stage, and epileptics, are not to marry without both being informed by verbal information from a physician as to dangers incurred."

In Brussels Dr. Paul Heger is giving university lectures on embryology and heredity, and in England medical institutions and town councils have united for lectures on venereal diseases and the distribution of literature, while the new Feeble-minded Act makes marriage of defectives a misdemeanor.

With regard to America, thirty of the States here have restrictive marriage laws: twenty-two simply have regard to the marriage of the insane, and eight regarding the unfit generally; but these laws are evaded by marrying in an unprohibitive State, so much so that another law is contemplated forbidding, say, those in Washington or Michigan going into Canada to marry. How about Zeppelin marriages?

CAREFUL DIAGNOSIS

It is now the fad to have articles on almost every imaginable phase of illness appear in our journals, and many of them describe more or less rare or, at least, obscure conditions. Any one reading a few of these must have the trite fact impressed on his mind that the only possible way to avoid frequent and serious blunders is to consider no diagnosis complete until the organs that present no suggestive symptoms have been examined and excluded, or, it would be much

better to say, have been excluded after careful examination. Only through such thorough care can we escape the chagrin of changing our diagnosis, or of having it changed for us by a more painstaking clinician, or, what is still worse, receiving enlightenment after the death of the patient. The organ most obviously disordered is often by no means the one in most urgent need of attention. Many a case of pneumonia is called meningitis or appendicitis. Guesswork will no longer satisfy the public. Instruments of more or less precision are coming into daily use, but their possession is not enough: a careful examiner will use them to confirm or to disprove a tentative diagnosis, and only rarely to direct his entire investigation.

This last must include the whole body, and then, and only then, can we be sure that the organ at fault has been located and will receive deserved attention. Biologic tests are multiplying in number, and occasionally, as when salvarsan is administered to prepare for, or, as it is called, provoke, the Wassermann, a therapeutic test is used, or used in conjunction with another.

In a recent paper by Friedenwald (*Am. Jr. Med. Sci.*, November) he makes the statement that the early diagnosis of cancer of the stomach is exceedingly difficult, and by a most thorough analysis of 1000 cases proves that in 23 per cent. of these there had been light attacks of indigestion extending over a period of five years, 76 per cent. apparently coming on very suddenly, and were then found far advanced. One deduction to make, then, is that until all cases that present any stomach symptoms receive a most thorough examination many early cancer cases will continue to be overlooked, and that to make a diagnosis of this affection it requires every one of the tests now known. A negative response to one or two has no value.

Veeder has in the same number of this magazine a paper on *duodenal ulcers in infancy*, and concludes that the affection is seldom thought of, seldom recognized, but doubtless much more common than literature would imply. If an infant, under six months of age, shows persistent vomiting, loses weight, and is constipated, or has mucous stools, the test for occult blood should be made. If tarry stools are passed, the diagnosis is more probable, and if coffee-ground blood is vomited, it is reasonably certain. Again: in the same number John W. Churchman states that a tubercular ulcer may exist in the bladder, but if in the vault, where the urine does not bathe it

unless unusually distended, the bacilli will not appear in the urine in sufficient amount to detect. The method he followed in such a case, and which he recommends, is to distend the bladder very fully with water, and centrifuge the washings. A clump of bacilli may be dislodged from the surface of a small ulcer by this means, and show under the microscope. Complement-fixation tests are receiving a share of attention, the results being in some cases most satisfactory. Wendell Reber, of Philadelphia, recently reported his experience with this method in some obstinate and obscure cases of ophthalmia. The possibility of it being due to old gonorrhoeal infection was thought of. The test was positive and the cases yielded to sensitized vaccine.

A. L. Garbat (*Am. Jour. Med. Sci.*, July) writes of complement-fixation tests for typhoid fever. His conclusion is that it is a valuable corroborative of the Widal, particularly to clear a doubtful diagnosis in the latter weeks of the disease; that it is possible to carry it out when a blood culture could not be made; but that it requires a highly polyvalent antigen, as there are many different typhoid strains that will only react to an antigen of a similar germ.

Writing of the early recognition of pulmonary tuberculosis, John Ritter, of Chicago (*Jour. Am. Med. Assn.*, Dec. 26), concludes that the presence of albumin in doubtful sputum renders the diagnosis of tuberculosis more of a probability. The presence of a large percentage of small mononuclear lymphocytes carries similar weight, and their coincidence makes the probability very great, even if bacilli are not found.

TROPICAL MEDICINE

Wild Game and Human Trypanosomes.—It has become an international question (for all nations have a share in Africa) whether wild game are reservoirs for human trypanosomes or other bacillie enemies. The Royal Society's Tropical Diseases Commission has been working hard on this problem in Africa, but has not yet pronounced judgment, for the slaughter of big game is no light matter to take in hand, particularly from a scientific and zoölogical point of view.

Professor George Prentice, who for ten years has been studying the relation of the tsetse fly to sleeping sickness in South Africa, ascribes the enormous increase of the fly to governmental protective

measures, and asks bitterly if European governments should force laws on primitive peoples which carefully protect the huge animals which eat up their crops, kill off their cattle, and carry in their blood disease germs of certain death to human beings. The infant mortality, particularly in Nyassaland and Rhodesia, is appalling, and he would have wild animals capable of acting as reservoirs of trypanosomes treated, *pro tem.*, as vermin. Where the Boers, for pleasure or profit, cleared off the wild animals, the tsetse fly disappeared. At any rate, the animals in infected areas might be impounded and killed.

Amæbic Dysentery.—The purification of the Canal Zone is earnestly advanced by scientists, both European and American. W. E. Deeks, chief of the Medical Clinic of the Ancon Hospital (*Annals of Tropical Medicine*, vol. viii, No. 2, 1914), gives as his opinion that there are only two species of entamoebæ found in man, but that the protozoölogist has yet much work before him in deciding this. The bacillus in amæbic dysentery has probably a water-borne origin: there is no endemic centre of the malady, and immunity, so far as we know, does not exist. Age, locality, nationality, or occupation plays no part in its etiology. He finds the bismuth-like-saline method of treatment the best, or, if emetine, a mixture of that and bismuth.

New Human Parasite.—Dr. J. W. W. Stephens,² professor of tropical medicine in the University of Liverpool, describes a new human parasite, which he proposes to call *Plasmodium tenue*, and which was found by him in a blood slide taken from a native child at Pachmari, Central India. He says its morphology differentiates it from any malaria parasite yet known.

Murmekiasmosis Amphilaphes.—As though we had not enough diseases to contend with, Drs. A. J. Chalmers and J. B. Christopherson tell of their discovery in Khartoum of an organism—*Cryptococcus Myrmecial*, Chalmers and Christopherson, 1914—which can cause the breaking out and spread of warts on the body. Their patient, an Arab boy of 16, had a few warts soon after birth, and these gradually spread and occupied the whole of the right side and neck, involving the external auditory meatus, destroying the eye, and involving the membranes of the mouth, gums, tongue, and throat. The growths do not, *per se*, destroy life, but they destroy organs.—(*Lancet*, July 18, 1914, p. 175.)

* *Roy. Soc. Proc.*, vol. 87, 1914.

Bilharziosis.—A brilliant idea³ has been carried out in Egypt of tracking up foci of bilharziosis with a travelling hospital. The soil, water, and habits of the attacked are now carefully studied *in situ*, and most satisfactory results obtained. The same plan is pursued with regard to ankylostomiasis.

In some of the instances it may seem that the deceased and every one associated have benefited, but the law does not confer on any of us the right to shorten another's life. Why not report such cases as suspicious? The result would be a perfunctory investigation, the wrath of the relatives, whether guilty or not, and no good accomplished. The knowledge, though, that an autopsy would be made, beyond question, would lessen the likelihood in many cases, at least, and would greatly aid us in our treatment of disease of many kinds. It would lessen also the tendency, one might as well say the habit, of nurses giving somnifacients and sedatives of various kinds to restless or wakeful patients. The harmless sedative or somnifacient has not yet been found. There are conditions in which the patient is sleepless, restless, perhaps even suffering pain, and yet careful consideration leads us to withhold the drug that would give the "gentle sleep," believing that, even though the patient waked again, it would be for a short time only. Every nurse, though, has her hypodermic and usually likes to use it. We may sympathize with her in her desire for rest from a restless patient, but her first duty is to obey orders.

EIGHT HOURS FOR NURSES

Last June, in California, the Eight Hour Labor Law was legally in force for nurses. It may be the thin end of the wedge with regard to all States. Its passing was opposed by many—doctors and nurses—but the majority of the latter were for it. It means decreased time in training for the pupil nurse, and it is a "misdemeanor" to allow them to give more time. Three nurses will be in attendance on one patient during the 24 hours, and nurses sent out to private cases, however far away, cannot legally exceed the time limit. The operating room will also feel the effects of legislation, as "time" may be called and the special nurse vanish before all the operations are over.

* *Brit. Med. Jour.*, June 13, 1914, p. 1311.

The Eight Hour Law has already closed all charity beds in California State hospitals, thereby filling almshouses, poorhouses, and city and county hospitals to overflowing.

AVIATION

Ambulance Aéroplanes.—These were first suggested by Colonel Cody, who died by the fall of his machine, but his suggestion to the British War Office took effect and a specially-built machine was instituted.

Aviatory Therapeutics.—In aviation man finds himself in entirely new conditions, and medical men are studying these. A. Loewy and S. Placzek (*Berliner klinische Wochenschr.*, June 1, 1913) have reported a series of tests on the attention and other psychic phenomena on themselves and two others in a cabinet with an atmospheric pressure of 4000 metres. The sensation of being able to give close attention was marked, and they reason that the high altitude and its constant changes paralyze the peripheral vessels, so that the blood pours into them and the brain, etc., and they become anæmic.

CEREBROSPINAL FLUID

From the neuropathological section of the Ospedale Maggiore of Milan, Professor Boveri (*New York Med. Record*, July 4, 1914) writes that he has submitted forty patients to a test for pathologic conditions present in the cerebrospinal fluid. The albumin content was increased in all cases, and the most marked reactions were seen in myelitis.

If one cubic centimetre of cerebrospinal fluid be placed in a small test-glass and an equal amount of a 1 to 1000 potassium permanganate solution superadded while the glass is held at an angle, a negative behavior shows that the fluid is normal, the glass having been previously shifted to the perpendicular. If the fluid is not normal, a yellow color zone will appear at the junction of the two liquids, and, if the glass be shaken, the entire bulk of the fluid becomes bright yellow, the rose-violet of the permanganate solution vanishing. But, if the fluid is normal, shaking makes it assume the rose-violet shade of the reagent. The more decided the reaction in a pathological fluid, the more promptly it appears.

CEREBRAL ELECTRIZATION

It is a fact that the endocranial organs are most accessible to electric currents, and the action of these is quite harmless. Stephane Leduc (*Arch. of the Röntgen Ray*, October, 1914, p. 160) pointed this out in an address before the British Medical Association, 1914, and showed that, whereas the peripheral nerves react at once but do not continue in activity, the central nervous system shows prolonged reaction. His use of it had proved very efficacious in psychical defects, mental depression, and cerebral neurasthenia, mental work became easier, and power of concentration was regained.

TWILIGHT SLEEP

Under this poetical title comes the anaesthesia during labor induced by our old acquaintance, scopolamine with morphine. The title is seductive and has not lost attractiveness through the newspaper descriptions. In selected cases the combination probably acts pretty well. In some few, however, the anaesthesia comes perilously near the borders of euthanasia, probably crosses them more often than has been acknowledged. The drug combination has a deserved popularity among American surgeons as a preliminary to ether for the induction of general anaesthesia for major operations, and, under some circumstances, may be used alone when ether, for some cause, is undesirable, but is always handled with respectful caution. When we induce general anaesthesia we thoroughly understand that the procedure is dangerous, should be carried out with care, and the greater our individual experience becomes, the more we know that in any patient there may develop, with scanty warning, a most alarming emergency. At such a moment the effect of a volatile drug like ether passes off much more rapidly than that of any solid introduced in solution through a hypodermic needle.

Twilight sleep has its place, but few obstetricians would be willing to use it without carefully selecting their cases. In *Merck's Archives* for December will be found an endorsement of the method by Dr. Jacob Heller, recording the results of the method in 150 cases in the Brooklyn Jewish Maternity. The cases were selected with good judgment, the method used with care, and the results, as given, would encourage further trial, at least.

TWILIGHT SLEEP

In a recent address before the Bucks County Medical Society of Pennsylvania, Professor Edward P. Davis, of the Jefferson Medical College, has this to say in regard to twilight sleep and pituitrin:

About the first, twelve years ago, this matter was brought to the attention of the medical profession by a German physician. His suggestions were almost identical with those made by Krönig and Gauss, but very probably the drugs which he employed were not as uniform in quality or in excellence. The method was taken up in this country by several American obstetricians, among them Newell, of Boston, and the consensus of opinion was that this method was uncertain, sometimes produced marked excitement in the mother, and frequently produced asphyxia in the child. It was accepted as one of the unusual methods of treatment, not applicable except with unusual precautions, and was temporarily abandoned.

I have had the pleasure of meeting Krönig in Europe and in this country, and those who knew him are impressed with his scientific standing and sincerity. His most remarkable work has been done in treating fibroid tumors by the X-ray, both with and without radium. When in America, about two years ago, he reported his methods of treatment, and his report is interesting for many reasons. He states distinctly that he never allows a friend or relative of the parturient patient to be with her during confinement. Each woman is very carefully watched. The method is not applicable to ward patients, but to private persons who have private rooms and private nurses. He stated that labor is lengthened at least a half hour, that children are not infrequently born somewhat asphyxiated, and that the death-rate among the children is the death-rate among all young infants in the part of the world where his hospital is situated. These are his individual statements, and must be taken to represent the most accurate presentation of the case.

I wonder if my colleagues in the Bucks County Medical Society know how this method got before the public. A woman journalist was searching for some topic which she could write up and sell to a magazine. While in Europe she heard of this method, and, under contract with a magazine, went to Krönig's Clinic and asked his permission to write it up. He promptly and very honorably declined. She then, by bribing the servants about the clinic, secured photographs and material for her article, which first appeared in an American monthly illustrated magazine. Before sending it to the publishing house in New York she asked Krönig to look it over and authorize its publication, and he again very commendably refused. Her American magazine publisher stated that Krönig had seen this article, which was true. He did not state that Krönig had endeavored to prevent its publication. The article is not strictly accurate, and was a piece of sensational journalism of the worst type. The same magazine is sending a woman through the large cities of the country giving talks on this subject at large department stores. In one of these talks recently in Philadelphia it was stated that all women should get up and go about very shortly after labor, that the diet of the average German hospital patient was all that is necessary for our women, and that our ideas of giving minute care to patients in labor were entirely unnecessary.

What are the facts as we know them at present concerning the action of

scopolamine in labor? It does not annul pain, but in many patients who are kept absolutely quiet the drug induces a state of mind in which the patient is practically oblivious to pain. She feels sensation, but does not remember. It is closely allied to hyoscine, and in some cases produces marked and violent excitement. Many patients have severe headache and nausea from the effect of the drug. It unquestionably, in some cases, interferes with the oxygenation of the fetal blood.

Regarding narcophen, the preparation of opium used by Krönig, this is much like morphine in its results. We all use morphine at times in treating labor, and we know its effects. It is very difficult to get an absolutely pure standard preparation of scopolamine at present. It is probably now impossible to get scopolamine and narcophen from the Freiburg Clinic, where Krönig's apothecary prepares the drugs for his use. It must also be remembered that Krönig insists upon special nursing and absolute quiet and isolation. How many times can we obtain this in treating our cases of labor?

From personal statements within the last few months made to me by my obstetrical friends in Boston and New York, who are representative men, writers, and teachers, I learn that none of them is employing this method in private practice, but that several of them are testing it in hospitals. During my recent service at the Philadelphia General Hospital, my colleague, Dr. Anspach, and I compared methods of treating labor. He employed scopolamine-morphine. I used codeine as a sedative, ether at the moment of expulsion, and strychnine and digitalin as tonics. It was the verdict of the hospital staff that the scopolamine method was uncertain and difficult in use. Practically the other method which was employed in my cases gave better results. Dr. Anspach stated to me that in some cases it is possible to use the scopolamine-morphine, but that it requires unusual experience and attention. I have no prejudice against new methods, for we must improve our methods constantly. At present the verdict of the best-informed men in the profession is that the method requires skilled and constant nursing, with hospital facilities, and that it is sometimes successful, often uncertain. We must know more about it before we use it in private houses.

In meeting the public on this question we will be asked frequently to employ this method by our patients. I personally state to them that I will not do so, because it has not as yet proved to be sufficiently reliable. We should, however, make a great mistake if we declined to do anything. When the skilful and intelligent profession ignore the complaints of patients, they open the door for the quack and the cheat. We should tell our patients that, while we are not willing to use a method of treatment which is uncertain, there are reliable drugs with which we are familiar, and that we will use them with great pleasure in their case. At the Maternity Department of the Jefferson Hospital our spontaneous cases of labor receive treatment addressed to stimulating the pains of labor and preventing suffering during the expulsion of the child. This effort is made in all cases, as the length of labor and the indications permit.

Regarding pituitrin, there is abundant evidence that it produces sudden and violent uterine contractions; that it is an exceedingly dangerous drug is shown by the fact that when given before dilatation is complete, presentation and position normal, the presenting part on the pelvic floor, and all the circumstances favorable for delivery, it may cause severe and often fatal injury to mother and child. It will temporarily control postpartum hemorrhage caused by uterine relaxation, but its effect lasts but a short time. It has a narrow field of usefulness, and if not employed with care and good judgment it is an exceedingly dangerous drug.

ANTENATAL HYGIENE

Prevention of disease was well on its way with all the numerous societies, medical and social, instituted to study children, but there is now a keen desire to take a step further—perhaps we should say backward—inquire into prenatal conditions of the infant. The Local Government Boards in England are arranging (a) efficient *antenatal* advice and treatment, home visiting, and prematernity wards; (b) skilled attendance during confinement; and (c) for diseased mothers, treatment of mother and child after parturition, and subsequent advice and treatment for infants, and home visiting. They recommend that every maternity clinic should be in touch with a well-equipped laboratory, and "Schools for Mothers" developed through voluntary agencies or local health authorities.

In Brussels special lectures on embryology and heredity were instituted last January and delivered by Professor Paul Heger.

ABDERHALDEN'S METHOD

J. Bresler, summing up the results of using Abderhalden's method (*Jour. of Mental Science*, April, 1914), says it has shown the sera of bodily and mentally healthy persons and of manic-depressives to be free from protective ferments. In dementia *præcox* destruction of the cortex cerebri and the sexual organs is nearly constantly found, sometimes of the thyroid, but seldom of the suprarenal, glands. In paralytic dementia there is destruction of the cortex cerebri, but none of the thyroid glands or sexual organs. In mental cases caused by thyroid disease destruction of the thyroid gland is found. It is an important fact that by this method dementia *præcox* can be distinguished from manic-depressive insanity and constitutional psychopathic states of mind, and is proved to be a form of insanity caused by morbid anatomical and chemical changes in the brain.

PSYCHIATRY

The increase of psychiatric clinics, the financing by the British Government of investigation into mental defects, the institution of diplomas in psychiatry by the universities of Durham, Edinburgh, Manchester, and Cambridge by which the degree of Doctor may be obtained, and the great advances made in America, have obtained for this specialty a more satisfactory position in the medical curriculum.

Dr. C. Hubert Bond (*Lancet*, Oct. 17, 1914) pointed out in his address to the Middlesex Hospital, London, that in not a single medical or surgical case can the mental side of the patient be safely ignored, and that with the removal of some of the perplexities with which the subject is strewn many men and women, in the obscurity of existing knowledge, are doomed to premature death or lifelong segregation from their friends. The establishment of psychiatric clinics is also urgent, because, in the schools, the student sees only certified cases, whereas in the former he has an opportunity of studying border-land and incipient ones.

INSANITY

The number of insane persons confined in institutions per 100,000 of the general population in the United States has increased during the past four decades from 86.5 to 232.0, and to-day the number varies much in the different States, from 67.0 in Oklahoma to 413.4 in Massachusetts.

The lunatic at large is quickly captured and taken to an asylum, but, added to the some quarter million in asylums in the United States there are reckoned about 300,000 mentally defective; then, if the epileptics, feeble-minded, and border-land cases are included, there are about a million persons harmful to themselves and others in the States, and not one-fourth of these know the slightest restriction concerning their power to reproduce their species.

That insanity is increasing is certain; some reports say at the rate of 3 to 4 per cent. every thousand of increased population.

Insanity in the Army.—At the end of an investigation upon patients with mental disease in the United States Army it was found that during one year (1913) mental disease figured in 20 per cent. of the total discharges, and dementia *præcox* was the most frequent, running as high as 56 per cent. in that year and 47 per cent. in other years.—(*Bull. No. 5, 1914, Washington, D. C.*)

Insanity in Ireland.—The increase of insanity in Ireland has been the subject of investigation, and mental abnormality seems to be lessening among the young, and the number of adult insane has doubled during the past fifty years. Some attribute it to the constant drain of the fit as migrants, leaving the old and the feeble to face adversity. The proportion of insane under care has increased from

250 per 100,000 in 1880 to 571 per 100,000 in 1913, and the proportion of recoveries in 1913 was 39.2, being 1.1 lower than in the previous year.—(*Lancet*, Sept. 26, 1914, p. 811.)

A "LIVING" CHILD

The Swiss law does not recognize as "living" any child born before 180 days of gestation (*R. Chapius, Rev. Med. de la Suisse Romande*, January, 1914), and a case is given of a child born at five months (the result of an accident to the mother) and living seventeen hours. Tessie reports one born at six months and living two months. In cases of conditional inheritance of property these should certainly be "living" children. The Roman Catholics regard the embryo as a "live" child from the first day of pregnancy.

BIRTH-RATE

The declining birth-rate is considered by Sir T. Oliver, of Durham, to be a characteristic of social democracy. In his presidential address in the section of industrial hygiene at the Congress of the Royal Institute of Public Health held at Edinburgh on July 17, 1914, he stated that the depopulation of civilized countries had become one of the greatest questions of the age. A wave of sentimental social economy had been passing over western civilized nations, with the result that the decrease in the birth-rate was most noticeable where social democracy was most to its front. The important problem was whether, when a nation had once adopted means to diminish its birth-rate, its people had the will and wisdom to arrest the movement. History said it had not. The rationalization of sexual life is one of these catching but misleading tenets of the times by the adoption of which men and women sought to show themselves superior to nature and capable of arranging their life according to science.—(*The Times*, July 18, 1914.)

OPHTHALMIA NEONATORUM

The various Bureaus of Child Hygiene are rapidly stamping this out. It has practically disappeared in New York City, where 60,000 babies are under medical supervision. Seeing that it costs \$15,000,-000 annually to care for the dependent blind in this country, it is well that the child hygienists meet with no opposition.

THERAPEUTICS

Restrictions.—Under this law, enacted by the New York State Legislature, 1914, restrictions are placed upon the prescribing and dispensing of opium, morphine, heroin, codeine, chloral, and preparations containing more than a stated amount of these drugs.

The New British Pharmacopœia.—A radical change has been made in the new British Pharmacopœia by using the metric system for all pharmaceutical and analytical computations, though, for the benefit of older practitioners, both systems are employed in this edition for the dosage of drugs. Acting on the recommendations of the international agreement respecting the unification of the formulæ for potent drugs, notification at the head of a preparation tells of any change in strength, notably with regard to tinctures; i.e., that of nux vomica has diminished, while strophanthus is four times as strong as before. An attempt has been also made to unify the contractions used for Latin words in prescriptions, these in the past being left to the vagaries of the prescriber.

But the greatest change of all is the small number of new drugs introduced—only 43—in spite of the market being flooded with new remedies. The new ones with long names have wisely been given a shorter one; i.e., hexamethylene-tetramine is given "hexamina." Many old friends have been discarded as useless, though, of course, the laity will never let them be disused; sarsaparilla, gamboge, jaborandi, and dandelion are among the doomed ancient remedies. But our wisdom of the present age may be but the foolishness of our lack of knowledge, and a broader feeling of tolerance towards those with whom agreement is not reached has been a special feature of 1914.

The Druggist's Interest in a Prescription.—The Mississippi Supreme Court has decided that a druggist has no right to retain a prescription when the owner calls for the medicine and asks for credit, as this might cause suffering, even death, to the poor. But the *Druggists' Circular*, April, 1914, contends that the customer should be compelled to return to the doctor and get a duplicate if he is not willing to reimburse the druggist for compounding the medicine. The dispenser was right to retain it as security for payment, and druggists, as a rule, can be trusted to discriminate between those who cannot and those who will not pay.

Cultivation of Medical Plants in the United States.—Few botanic drugs of importance are cultivated in the United States, and a scarcity will be felt during the war, so the International Congress of Applied Chemistry is taking active steps in the investigation of drug-plant cultivation; but the fact that a plant can be grown experimentally does not prove it can be produced successfully on a commercial scale: the experimental stage has not been passed. The increasing price of *Cannabis indica* led to its cultivation here, but the best samples (from South Carolina) sent in to the United States Department of Agriculture tested out only 75 per cent. as active as the imported drug, and Indiana and other States had even a lower percentage. The cultivation of henbane has been so unsuccessful that the idea has been abandoned, and that of belladonna, grown in the Shenandoah Valley, has a percentage of total alkaloids which is fair, but extremely variable.

The object of an association with a very long title is to bring about a condition of medicinal plant cultivation which our medicinal forefathers always maintained. The Office of Drug-plant and Poisonous-plant Investigation, Department of the Federal Bureau of Plant Industry, has redoubled its work and investigation since the war sent up every drug in price and exposed American doctors to the risk of going without or using inferior preparations.

Insomnia and Adalin.—In the use of adalin and, indeed, in many others the old formula, "To be taken at bedtime," is changed into a bombardment of the wakeful by giving it as a sedative in fractional doses of 0.25 to 0.5 Gm. three or four times daily. This prepares the patient for a night's rest, though, in urgent cases, it may be given —1.0 to 1.5 Gm.—half an hour before bedtime in some hot drink. It is a comparatively safe drug. Once, for suicidal purposes, 70 grains were taken; once 140 grains, but the only result was a prolonged sleep with no marked evil effects.

Asthma Treated by Adrenalin Chloride.—By the use of a solution of 1 in 1000, with 0.5 per cent. chloretone, in doses of 5 or 6 minimis, H. W. L. Waller (*Lancet*, Aug. 15, 1914) confirms its efficacy in spasmodic asthma, the advantage being that smaller and smaller doses are found efficacious, a minute dose such as 1 minim being sufficient in a chronic case. It gives relief even when morphine fails.

Adrenalin and Urinary Secretion.—A case of a patient, aged 72, invalidated through great weakness, but apparently exhibiting only the symptoms of insufficiency of ureal output, is given by Ralph Hopton (*Brit. Med. Jour.*, Oct. 17, 1914, p. 669). The urinary secretion was only 10 to 12 ounces daily, and, after some weeks of treatment, adrenalin was tried. In 48 hours the urine rose to 40 ounces, and in a few days the patient was up. The improvement continues, though occasionally adrenalin is given.

Commenting on the case, Sir Berkeley Moynihan said that he had paid much attention to the converse side of the question, and considered excessive activity of the suprarenal glands to be a cause of arteriosclerosis. He suggests surgical measures depriving the gland of its blood supply and leaving it attached by only a few strands of tissue.

Alcoholism.—An International Conference against Alcoholism met at Paris in May, 1914, under Professor Débove, and Dr. Lauer proposed the establishment of an international institute for scientific study of the subject.

Increased working efficiency has followed enforced temperance in all departments of labor. Large firms, such as the Pennsylvania Railroad, employing 125,000, and the American Car and Foundry Company, with nearly 6000, employ only abstainers. The Pittsburgh Steel Company filed a petition against the saloon, as a menace to its 5000 employees, socially and physically, for 20 per cent. of the wages went in drink and 85 per cent. of accidents were directly or indirectly due to liquor. Reform, based on economics, will surely flare ahead in this practical country, and much of the \$250,000,000 accruing from disability of workingmen will be saved.—(*Outlook*, August, 1914, p. 858.)

Inebriety.—Following the recommendation of Surgeon-General Braisted, Secretary of the Navy Josephus Daniels issued an executive order abolishing all liquor from every ship and station in the navy. Russia and France prohibited all liquor during the war.—(*J. A. M. A.*, April 11, 1914, p. 1176.)

The Bile in Gall-bladder Disease.—At the American Gastro-enterological Association (1914) Max Einhorn stated the macroscopical appearance of the bile to be of great importance. If golden-yellow and clear, it showed normality; if greenish-yellow and turbid,

a diseased state, often gall-stones; while in catarrhal jaundice it frequently contained mucus, perhaps no mucus at first, but afterwards bile and mucus. The duodenal contents containing bile and pancreatic secretion permitted a gauging of the pancreatic function.—(*Med. Rec.*, Sept. 19, 1914, p. 527.)

Bismuth Subgallate Gauze for Wounds.—During the war, Lieutenant-Colonel E. A. R. Newman (*Brit. Med. Jour.*, Nov. 14, 1914) found bismuth subgallate gauze of great service in the treatment of suppurating and infected wounds. It serves all the purposes for which iodoform gauze used to be advocated, and is definitely inimical to saprophytic infection and quickly abolishes the fetor of foully septic wounds. Its bright primrose color distinguishes it at once; it is non-volatile and is therefore sterilizable.

Carnosin.—Among the heterogeneous collection of the undiscovered products in meat, a Russian chemist, Gulewitsch, has brought to light the base carnosin, which deserves to rank prominently among the extractives of muscle. It has an empirical formula, $C_9H_{14}N_4O_3$, and appears to be a dipeptid composed of the amino-acids histidine and beta-alanin.

Charcoal in Internal Diseases.—At the Congress of Internal Medicine at Wiesbaden, the report of Wielchowski and Adler on charcoal in internal conditions was worthy of interest. The experiments of Wielchowski showed that if certain forms of charcoal are administered simultaneously with poisons, the latter become inert. He considers a marked delay in absorption as the cause of this antipoisonous action. It is a well-known fact to laboratory workers that many highly-colored solutions when filtered through animal charcoal lose their color. If a bolus methylene blue combination is taken, the urine becomes blue, but if a combination of animal charcoal and methylene blue be given, methylene blue is not set free in the system and the urine retains its normal color. O. Adler tried out charcoal systematically in various intestinal conditions and cases of poisoning. All of the latter (including phosphorus, sublimate, and morphine poisoning) recovered. Enteritis and gastritis, with no anatomical change, were favorably influenced. Hyperacidity and intestinal processes, due to bacteria, also seemed to improve. A saline cathartic should be given after the charcoal.—(*Therap. der Gegenwart*, 1914, No. 5; abstract in *Merck's Archives*, July, 1914, p. 225.)

Coagulen.—A useful styptic is in use in some of the Dresden clinics which originated with Professors Kocher and Fonio, of Berne (*Deut. med. Wochensch.*, June 25, 1914). It is a light brown, coarsely granular powder, soluble in ether, chloroform, alcohol, normal saline, and water, and is derived from blood-platelets. Its sponsors claim, and experience has determined, that it brings parenchymatous hemorrhage to an abrupt end; and for hemorrhage from vessels of small calibre the quiet application of coagulen with artery forceps renders the use of ligatures unnecessary, and even severer bleeding from larger vessels may be checked. In operations for prolapse and posterior colporrhaphy it has given most satisfactory results.

The Corpus Luteum.—The medical world is confronted with the question of the superiority of extracts from corpus luteum from pregnant animals (corpus luteum verum) over those from non-pregnant animals (corpus luteum spurium). W. T. Dannreuther (*Jour. Amer. Med. Assn.*, Jan. 31, 1914, p. 359) asserts that only the former are efficacious, and attributes failures to the use of the latter; but, from an inquiry, it was found that at least 83 per cent. of the cows were pregnant. The true therapeutic value of the two varieties cannot be determined until the desiccated gland can be standardized chemically.

Corpus Lutea in Profuse Menstruation.—Judging from results, Landsberg thinks it justifiable to recommend extract of corpora lutea for uterine hemorrhage, especially if occurring at puberty. He so treated seven cases of profuse menstruation, and, in every case, the bleeding stopped. One cubic centimetre was injected every other day, and repeated six to twelve times, in accordance with the severity of the case. Two cases of profuse bleeding at puberty were treated and kept under observation for two or three months, and menstruation was regular and not profuse.—(*Therap. Monatshefte*, No. 5, 1914; *Merck's Archives*, June, 1914, p. 199.)

Infantile Uterus and Corpus Luteum.—A case of infantile uterus is given by H. R. Elliott (*Jour. Amer. Med. Assn.*, April 4, 1914) where the patient, a married woman of 27, with boyish figure, narrow hips, and undeveloped breasts, had been examined by a gynaecologist and told she could have no children. The uterus was rather larger than a walnut; the ovaries not palpable. A trace of menstruation had occurred three or four times, but nose-bleed was free at times. The treatment was an extract of luteum tablet three times a day for

a week, then two twice daily for another week, and this two weeks' cycle repeated. The menses appeared within two months, the patient's form seemed to round out, but she grew discouraged and gave up treatment. Some months later she renewed it: the boyish figure changed to normal, and pregnancy, with uneventful delivery, ensued.

Action of Drugs on the Human Uterus.—Taking advantage of the fact that the involuntary contractile tissues of mammals can be kept exsiccated in Locke's solution at ordinary room temperature for many hours, while executing normal rhythmic movements when placed in oxygenated Locke's solution at body temperature, Professor J. A. Gunn (*Roy. Soc. Proc.*, April 30, 1914) tested the response of the isolated uterus to certain drugs. The non-pregnant uterus and fallopian tubes responded to adrenin by contraction. This is of importance in regard to sympathomimetic substances in human labor. Piturin stimulated the uterus, but not the fallopian tubes.—(*Brit. Med. Jour.*, May 9, 1914, p. 1027.)

Frost-bite.—During the European war, Lieutenant-Colonel A. B. Cottell found the best treatment for frost-bites contracted in the trenches was to dust the parts with boracic powder and to keep the foot raised and enveloped in wool, loosely bandaged. He deprecated the use of two pairs of socks, as this restricted the superficial circulation. A thick-lined leather or canvas boot in every case had proved of more use in keeping the feet warm.—(*Brit. Med. Jour.*, Dec. 5, 1914.)

Sore Feet.—During the war the suffering of soldiers through thin socks and worn boots set the medical corps to work in prescribing remedies. Major J. B. Simpson, R.A.M.C., found his men were helped by soaking the feet in a hot saturated solution of alum, preferably at night, and, next morning, smearing the socks with soft soap. This is an old remedy with deer-stalkers and shepherds in the Scotch Highlands.

Herudin.—The use of herudin in the transfusion of blood is pointed out by H. S. Satterlee and R. S. Hooker (*Jour. Amer. Med. Assn.*, June 6, 1914). This drug, the active principle of a secretion of the buccal glands of the pond leech (*Sanguesuga medicinalis*), has a decided effect on the prothrombin and antithrombin balance and a neutralizing action on thromboplastin.

Hot Air and Burns.—Noticing that, after a burn, portions of the

skin left exposed to air healed more rapidly, U. Stoppato (*Policlinico*, Aug. 9, 1914) experimented successfully in healing by keeping the surface of the granulating area dry by a jet of hot air. Bad burns were cured after some 15 to 30 applications, the heat stimulating repair of epithelium by the hyperæmia it induced.

Dressing for Burns.—M. Gregory claims for fluidextract of *Calendula officinalis*, or marigold, that it is a most effective, healing, and antiseptic dressing for burns (*Medical Council*, May, 1914), and superior to ichthylol, picric acid, iodoform, and lead carbonate. He warns against any preparation save the fluid, non-alcoholic extract, of which he adds 2 ounces to 14 ounces of saturated boric acid solution and applies on absorbent cotton.

Ionization in Venereal Disease.—It is claimed by Dr. Agnes Savill (*Brit. Med. Jour.*, Feb. 14, 1914, p. 368) that in cases of endocervicitis and endometritis, with purulent discharge of many years' standing, she has brought about complete cure by a short course of ionic medication. In one case of gonorrhœa of urethra and cervix, with profuse purulent discharge, swabs taken from both infected regions two months from the beginning of ionic applications showed a healthy mucous membrane. The view of Dr. Savill is supported by Surgeon R. Connell, who had used them for the soldiers.

Ipecac in Pyorrhœa Alveolaris.—Probably nothing of more interest to both the profession and to the public has been accomplished recently than the revival of an old and forgotten discovery that ipecac would benefit cases of Riggs's disease (pyorrhœa alveolaris). As so often occurs, the investigation has been successfully made by several independent observers at the same time. Bass and Johns use emetine by hypodermic, while Barrett and Smith use the same drug by injection into the infected gums and into the tooth sockets. It has not been entirely settled whether the amœba found is the sole cause of the disorder, but it seems to be proved that its presence is constant and deleterious, and that the emetine destroys it.

The presence of Riggs's disease has been considered a frequent cause of intestinal toxæmia and rheumatism, and to predispose to chronic nephritis and other disorders dependent on septic absorption.

Emetine in Amœbic Dysentery.—The conclusion of Jerome Wagner (*Merck's Archives*, February, 1914), based on his own results in emetine and those of the initiatory user, Leonard Rogers, are

that the best method of administration is in daily doses, hypodermatically, of one-half grain of emetine hydrochloride dissolved in sterile water, extending over a period of seven days. At the end of that time all the symptoms of disease have disappeared and no bad effects appear. The patients, up to date, had shown no sign of recurrence except two who returned with slight diarrhoea; two or more doses may be injected in diarrhoea to assist in diagnosing the origin of the dysentery. Intermittent treatment with emetine is advised to ward off possible recurrence.

John M. Holt (*Public Health Reports*, vol. 29, No. 31, July, 1914) gives disconcerting returns for amœbic dysentery, stating its extended area over the United States in the past ten years. He advocates emetine as giving brilliant clinical results, but adds that it is impossible yet to say that patients remain cured. Though prospects of obtaining permanent cures by emetine are encouraging, the patient under treatment must still be considered as a source of danger, as the presence of amœbe can still be demonstrated.

The Electrolytic Bath in Lead Poisoning.—That it is possible to remove lead from the human body by electrolysis in plumbism was urged by Sir Thomas Oliver, but Kenneth Goadby and W. H. F. Oxley (*Lancet*, Oct. 3, 1914, p. 846) maintain that lead in demonstrable quantity cannot so be removed, and their experiments, both on men and animals, were negative. The proportion of lead ions to general tissue ions is so small that almost the whole current would be conveyed by the latter, and the lead ions would be concerned only to such a minute extent in the conduction of the electricity that the weight of lead set in movement would be excessively small and undetectable by chemical analysis; moreover, the lead in tissues exists in a combination which keeps it out of action.

Bichloride of Mercury.—The new regulation from the Board of Health, New York City, provides that bichloride of mercury tablets cannot be sold at retail without a physician's prescription, and the tablets must be of a distinctive form and color. The restrictions do not apply to wholesale dealers.

Oil Ether Colonic Anæsthesia.—Five hundred cases where this was used successfully are given by J. T. Gwathmey (*Am. Jour. of Surgery*, July, 1914, p. 268), who gave the first successful demonstration at the People's Hospital, New York, September, 1913.

Laboratory reports from the Department of Health, New York City, state that the colon bacillus is killed in one minute by a 75 per cent solution of ether in olive oil. The advantages claimed are: (1) Administration in bed; (2) absence of apparatus; (3) an even narcosis; (4) reduction of postoperative vomiting; (5) return to consciousness in an analgesic state. It is, however, contra-indicated in any pathological condition of the lower bowel, such as colitis, hemorrhoids, fistulae, etc.

Placentin.—Seventy pregnant women, inoculated with a substance termed placentin, extracted from the placenta by Engelhorn and Wintz (*Münch. med. Wochensch.*, lxi, 1914, p. 698), had a positive reaction at the site of inoculation (redness, swelling, brown-tinted skin). All non-pregnants failed to react.

Opium in the United States.—It has been found that there has been an increase of 351 per cent. in the amount of opium imported in the last decade, against an increase of population of 133 per cent. The fact that there is excessive consumption is confirmed by inquiry from importers of opium and manufacturers of morphine, who state that from 70 to 80 per cent. of the imported medicinal opium is converted into morphine, and at least 70 per cent. of this consumed by *habitués*.

*The Use of Oil of Chenopodium in the Treatment of Hook-worm Disease.*⁴—Among the inconveniences entailed by the European war is the failure of the supplies of thymol, used so largely in the southern hook-worm campaign. As a substitute for this drug, now almost unobtainable, American wormseed oil (*Oleum Chenopodii U. S. P.*) has been suggested.

As indicated by the name, wormseed has long had a reputation as an anthelmintic. The plant from which the oil is distilled grows "in waste places from New England to Florida and westward to California." It has, however, been cultivated particularly in Maryland, and the oil has been known as Baltimore oil, in contradistinction to the western oil, which is no longer much of a commercial factor. While the oil is almost wholly a Maryland product, it is said that the seed is harvested in considerable quantities in Florida, where the plant is one of the most pestiferous of the weeds.

Renewed interest in the possibilities of American wormseed oil, especially against round worms, seems to date from the publications of Brüning, in 1906, who, with Gockel, Kobert, Linke, Schmitz, Thelen, and others, has investigated the pharmacology of the oil. The chemistry of oil of chenopodium has been studied in Germany by Wallach and others, and in this country by Kremers and by Nelson, of the Department of Agriculture.

⁴ Murray Galt Motter, Technical Assistant, Division of Pharmacology, Hygienic Laboratory, United States Public Health Service.

Clinically, its value, especially for the treatment of round worms, was well established. In 1912 Schüffner and Vervoort presented to the Fifteenth International Congress on Hygiene and Demography a paper in which they sought to demonstrate the superior advantages of oil of chenopodium in the treatment of hook-worm disease as compared with other vermifuges. These authors, in the course of eight months, had given oil of chenopodium in 1457 cases. Giving eucalyptus oil a coefficient of 38, naphthol 68, and thymol 83, oil of chenopodium surpassed them all with a coefficient of 91.

Toxicologically, a search of the Index Catalogue and the Index Medicus revealed but twelve published cases of poisoning by wormseed oil in something over fifty years, the first having been published in 1852 and the last in 1903. Of these cases eight were fatal. The report of one of the fatal cases is cited by Wood, with the added comment: "It is plain that the wormseed was not the direct immediate cause of all these symptoms or of the fatal result." All of the reported cases, however, show a certain general similarity, indicating that the toxic action is exerted particularly upon the central nervous system. Salant, in a preliminary report of his studies on the pharmacology of this oil, notes the possibility of cumulative action, indicated by the fact that the nontoxic doses, when repeated in a day or two, were fatal in the rabbit. In the reported cases of poisoning the dose appears to have been excessive and, in some cases, repeated. Brüning asserts that when properly used this remedy does not cause any unpleasant secondary actions, an experience confirmed by that of subsequent workers.

It is to be noted that oil of chenopodium is a paralyzant rather than a parasiticide. It narcotizes the parasite, which must then be got rid of by free purgation. Moreover—and here it differs radically from aspidium and thymol—it is probably best administered with castor oil. In the case of aspidium and thymol the coincident or subsequent use of any oil is to be avoided, because, their constituents being soluble in oils, they are thereby rendered more toxic to the human subject. With reference to chenopodium, which in itself appears to be constipating, the castor oil does not add to its toxicity, but offers a ready method of ridding the host both of the parasites and the drug.

Schüffner and Vervoort administered 16 drops of oil of chenopodium with sugar every two hours for three doses. Two hours thereafter they gave a tablespoonful of castor oil with a teaspoonful of chloroform. Gockel gives the single dose as 8 to 16 drops, according to age—6 to 8 years, 8 drops; 9 to 10 years, 10 drops; 11 to 16 years, 12 drops; over 16 years, 12 to 16 drops. Should untoward symptoms arise, particularly inordinate sleepiness or depression, the chenopodium should be withdrawn at once, active purgation induced, and stimulation begun with strong hot coffee by the mouth or by the rectum.

Owing to its increased vogue in continental medicine, the demand for this product has increased in the past few years. Schimmel reports that the acreage put to wormseed increased from about 90 acres in 1910 to perhaps 225 acres in 1912, while the yield rose from 2800 pounds in the former to 6700 pounds in the latter year. In view of the fact that October is the time of harvest and that, with the diminished or disappearing supply of thymol, the demand will probably be still further increased, every effort should be made not only to husband this year's crop to the best advantage, but to provide for a largely-increased seeding next spring.

Physicians having hook-worm cases under their care should give this remedy

a thorough trial and report promptly their results in the medical journals. Case notes should be accompanied by information as to the sources of the oil used and, if possible, as to the method of distillation; it has been alleged that *chenopodium* grown in different localities, and oils distilled by different processes have shown varying degrees of efficacy. For use in the South, where the plant grows as a weed, the possible efficacy of a decoction, made by boiling one ounce of the fresh plant in a pint of milk or water, administered in wineglassful doses, should be remembered and tried under careful supervision. Data of this kind should aid in rehabilitating a truly American remedy, said to have been used by the Indians as a vermifuge before the landing of Columbus, and in helping the American profession to do without some of the products which hitherto have been almost wholly "made in Germany."—Reprint from the *Public Health Reports*, vol. 29, No. 40, Oct. 2, 1914.

Extract of Pineal Gland.—Carey Pratt McCord (*Jour. Amer. Med. Assn.*, July 18, 1914, p. 232) gives the result of administering doses of the gland, and concludes that the giving of minute quantities of pineal tissue from young animals to young animals stimulates rapid growth of the body, but not beyond normal; also, there are less well-established indications of precocity of mental and sexual development.

The Pineal Gland in Retarded Mentality.—That the pineal gland is a valuable remedy for juvenile retarded mentality is a theory advanced by William Berkeley (*Dominion Medical Monthly*, May, 1914), and he speaks from happy experience. The remedy must be given for six months, and is prepared from the glands of young bullocks. Let the fresh glands be rapidly dried, mixed with milk-sugar, and put up in capsules, each corresponding to 150 pounds of bullock. The ordinary dose for a child of 25 or 30 pounds weight is one to two *per diem*.

Berkeley, in 1913, treated about a dozen cases of premature mental failure in elderly persons showing no obvious organic lesion. "It seemed to stimulate the aging brain to the faster chemistry of younger days."

Pituitrin in Labor.—The property of pituitrin in inducing strong rhythmical contractions of the uterus makes P. A. Hendley, who gives 60 successful cases, regret its too infrequent use (*Brit. Med. Jour.*, April 25, 1914, p. 906). He pronounces it a powerful remedy when shock and collapse have supervened on prolonged chloroform anesthesia, and it is excellent as a controller of hemorrhage; moreover, it shortens the often exhausting first stages of labor. In the 60 cases there was not one of postpartum retention of urine. See also remarks of Professor Davis on pituitrin, which are to be found on page 238 of this issue of the CLINICS.

The Pituitary Gland and Epilepsy.—If, as has been argued, epileptoid seizures are in part due to the animal economy being deprived of necessary metabolic substances which are produced within the pituitary, it is reasonable to place some hope on the administration of pituitrin by the mouth, since the recent results have shown it to be of great service. G. C. Johnstone (*Surg., Gyn. and Obstet.*, xvii, 1914, p. 486) adds that it is given in gradually increasing doses, while bromide is slowly withdrawn.

The Therapeutic Use of Sugar.—The value of intravenous injections of hypertonic solutions of glucose has been proved by E. Enriquez (*Presse Méd.*, February 14, 1914) in cases of infectious diseases with partial suppression of urine. A marked diuresis was produced, and a case of carbon-monoxide poisoning was apparently saved by this measure. In cases of oliguria secondary to cardiac weakness and in chronic nephritis it is good on account of its tonic action on the heart and its diuretic power.

Armed by Vaccines.—The bullet-proof soldier has not yet arrived, but Sir Almroth Wright (*Lancet*, October 3, 1914, p. 856) urged the wisdom of compulsory vaccine for typhoid, but, also, that an antisepsis vaccine,—i.e., a mixed streptococcus and staphylococcus,—should be used as a prophylactic against the septic infection of wounds, as these, if employed in time, would almost invariably prevent and abort corresponding septic infections.

There have been many new remedies suggested and used this year, chiefly vaccinotherapeutic, the chief being the “vaccine antigonococcique” of C. Nicolle and Blaizot. This is a vaccine rendered stable by the addition of fluoride of sodium to a germ of the urethra, which the authors have found for the most part in blenorragia—the synoc.—(*Paris Médicale*, August, 1914, p. 213.)

RADIUM THERAPY

The latest data from the clinic of Küstner and Heimann comprise eighteen months' work in the Breslau University Clinic for Diseases of Women (*Deut. med. Woch.*, August 13, 1914). Ninety-eight cases were treated, including forty-four of inoperable cancer of the uterus, and seventeen inoperable recurrences; also seventeen other cases of prophylactic raying and seven in which raying immediately preceded operation. Of the forty-four, the majority were pronounced

inoperable after trial laparotomy. During the eighteen months eight died. In eight others treatment failed, because treatment was neglected by the patients; the remaining twenty-eight all showed improvement. Of the series of seventeen, one died, two were failures, the others all showed improvement. In three operable cancers in old persons and in a diabetic patient the growths completely disappeared.

Russian Mineral Oil.—Owing to the recommendations of Sir Arbuthnot Lane and his followers, the Russian oil, differing slightly from the liquid petrolatum of the U. S. Pharmacopeia, has been put on the market for intestinal stasis and other bowel troubles.

Petrolatum.—The absorption of mineral oils is strongly advocated by A. Manquat (*Bull. de l'Acad. de Méd.*, Paris, Jan. 27, 1914, p. 93), as it not only lubricates but has a soothing action on spasmotic contraction and retards intestinal absorption. It is especially good in cases of hemorrhoids, prostatic enlargement, mucomembranous enteritis, and chronic appendicitis after abdominal operations.

SALVARSAN AND NEOSALVARSAN

Sympathetic Ophthalmitis.—Some months ago Mr. Lang and Mr. Browning (*Trans. Royal Soc. of Med.*, February, 1914) opened a discussion on the use of salvarsan in ophthalmotherapy, as Mr. Browning had found the blood count in cases of sympathetic ophthalmitis to be much the same as in syphilis and allied conditions of protozoal origin, and injections of salvarsan were tried with favorable results on cases under his care. One point was interesting: that after such treatment the differential blood count always tended to revert to normal, and, in the intervals of treatment, it became of the protozoal type. Mr. Lang described a case of sympathetic uveitis, caused by a gunshot, treated successfully by salvarsan, and quoted another where, after injection of neosalvarsan, an unusually good result was obtained in a postoperative plastic iridocyclitis. It was urged that only a specially trained haematologist could give a correct reading of a blood count, as the differentiation of the leucocytes was not an easy matter.

Serosalvarsan and the Feeble-minded.—With the advent of the serological test the frequency of weak-mindedness in syphilitics has been established, and, on the ground that any improvement is desirable, L. Findlay (*Glasgow Med. Jour.*, No. 4, October, 1914, p. 242) urges the use of neosalvarsan intravenously or intramuscularly, be-

cause he has found this procedure useful in improving the mental condition. He quotes tests made in Glasgow in which evidence of lues was found in 60 per cent. of 205 mentally defective and epileptic children. Krober, of Vienna, puts the figure in his cases at 21 per cent.

Three of Findlay's cases were real idiots, but in each of these the children became sufficiently intelligent to look after themselves, run messages, mind the baby, learn to read, etc. He thinks that, if treatment were begun at an early age, complete cure might be possible.

Serosalvarsan Treatment of Paresis and Locomotor Ataxia.—The serosalvarsan treatment of paresis and locomotor ataxia was originally tried by Swift and Ellis, of the Rockefeller Institute, in 1912, their method being the intravenous injection of salvarsan into the patient and the utilization of his salvarsanized serum for intraspinous injections. Otto Lowy and George B. Gale, in papers read before the Newark Medical League, February, 1914, reported successful cases and no fatalities. In checking up the effect of treatment, careful note was made of the Wassermann blood test, the Wassermann reaction to the spinal fluid, and the globulin test and cell count. In patients where there is occlusion of the foramina Majendie and Luschka and a dry tap is the result, they advise trephining the skull and introducing the serum into the subarachnoid brain spaces. It is possible for cases of paresis, presenting positive evidence of destruction of brain tissue, to again become normal. The syphilitic action can be entirely eliminated; new centres will take up the work and, because of the elimination of the infection, remain permanently in control. Ehrlich has shown that it is not the quantity of the salvarsan, but its introduction to where the spirochetes are found, that is of value. By intraspinous injection of serosalvarsan either the salvarsan in a modified form or antibodies which have been produced by it are introduced into the spinal canal, and the spirillotrophic action is attained.

X-RAYS

Röntgenocinematography.—The interpretation of findings in diagnosis of surgical lesions of the stomach and duodenum has been worked out in a study of about 20,000 röntgenograms in 680 cases by George E. Brewer and Lewis Gregory Cole (*Annals of Surgery*, June, 1914, p. 111). They have perfected a true röntgenocinematographic ma-

chine capable of making 50 röntgenograms of a single cycle or 200 of an individual peristaltic contraction from the fundus to the pylorus. Out of 21 cases, 20 were correctly diagnosed, the clinical history, physical examination, and gastric analysis being unknown to the operators.

X-rays as an Analgesic.—Too little is known of the X-rays. H. Eckstein (*Berliner klin. Woch.*, Sept. 7, 1914) made personal experience when he sprained his hip-joint. The pain vanished under examination, and he had no more for a week, when a second exposure removed it permanently. The power of the rays to arrest pain has been used in tumors, leukæmia, and will probably prove no less so in neuralgia and nervous diseases. The writer urges it also for after-pains in operative cases, and has never seen any harm result therefrom.

X-rays and Chronic Suppuration.—Many cases of persistent suppuration have been healed by radiotherapy during the past two or three years by E. P. Cumberbatch, St. Bartholomew's Hospital, London (*Lancet*, May 16, 1914, p. 1392). The suppuration is arrested, the part healed, and the cure permanent.

Röntgen-ray Burns.—Though a patient often demands an X-ray plate as part of the medical examination, he is often found bringing an action for a burn produced by the process, and röntgenologists are, as it has been sorrowfully shown, liable to lose limbs or even life in the service of radiotherapy. E. P. Cumberbatch (*Arch. of Röntgen Ray*, October, 1914) finds the following opaque to rays, easily moulded, and non-adhesive to the skin:

	Parts by weight
Beeswax	1
Vaseline	1
Resin (finely powdered)	$\frac{1}{4}$
Lanolin (hydrous)	$\frac{1}{2}$
Lead oxide (litharge), finely powdered	6

A layer of one millimetre thickness appears quite opaque to the rays when placed under a screen between it and the source of the rays.

Pernicious Anæmia in Radiologists.—The dangers to which operators in radiotherapy are liable have not been given sufficient attention, though the death-roll of Röntgen-ray workers is not a short one. H. Heineke (*Münch. med. Woch.*, Dec. 2, 1913) reported six cases of leukæmia in radiologists, and a fatal one is recorded by Cavazzeni and Ninelli (*Radiologic Med.*, February, 1914) in a col-

league where the only outward signs were a slight affection of the left hand and cheek, but autopsy revealed a spleen showing active blood destruction, and both testicles were shrunken, with changes in the osseous medulla. C. Aubertin (*Paris Méd.*, July, 1914, p. 159) also gives cases where anæmia was due to operating X-rays and where the genital glands were also affected.

Infant Feeding and the X-ray.—The kindly X-ray has been used as a searchlight in the tender infantile stomach, and has denounced the mother who gently lays her fed baby to sleep in the same position as it was in when sucking. There is then, according to Charles Hendee Smith (*Med. Record*, Oct. 24, 1914, p. 738), gas at the fundus end of the stomach, and the infant should be held upright, both before and after feeding, that it eructate the gas. Mothers have much to learn, but they unconsciously endorse the gaseous finding of the X-ray when they take up the crying, wind-distended baby and hold it up against the shoulder, patting its back: only this should have been done before putting it in the cradle.

AACUTE ANTERIOR POLIOMYELITIS.

That this widely distributed and dreaded disease is due to a micro-organism and is infectious has undoubtedly been proved by Flexner and others, and the former is now experimenting with a new serum. The disease in epidemic form has gone on increasing in Europe, Norway, Sweden, and America, though not until 1811 did it show signs of epidemic infectivity in England. Dr. Robert Jones (*Brit. Med. Jour.*, May 30, 1914) proscribes as harmful massage of paralyzed limbs, urging rather the use of immovable splints, because a paralyzed muscle is easily hurt even by massage and passive stretching. An urgent prophylactic measure is the destruction of discharges, also the use of a 1 per cent. solution of hydrogen peroxide in spraying the throat and nose of contacts. Two weeks' isolation after the onset of disease, and thorough disinfection after recovery, are absolutely enjoined for the patient.

Robert Jones, referring to progress made (*Lancet*, May 30, 1914, p. 1515), quoted the work of Stoffel, who, by an elaborate system of dissection, worked out the topography of the cross-section of nerves, whereby any bundle of nerves required at an operation may be secured. Nerve graftings have been materially helped by this discovery, as

healthy nerve tracts, supplying muscles of minor importance, may be used for implantation into paralyzed nerves. The results of neuroplasty in poliomyelitis can hardly yet be estimated, but the procedure is full of hope.

FOOT-AND-MOUTH DISEASE

An epidemic of foot-and-mouth disease has been prevalent to an alarming extent during the past year in America and elsewhere, causing a large monetary loss to those owning cattle, and considerable inconvenience in unexpected ways, as by the laboratory worker being unable to secure sheep's blood for the performance of the Wassermann test, owing to the closing of the abattoirs for disinfection.

According to the specialists of the Department of Agriculture, people even in States quarantined for the foot-and-mouth disease need have no fear of eating meat, provided they cook it thoroughly. The foot-and-mouth disease is not easily communicated to human beings through food, although milk from a diseased cow does transmit the disease to a human being. In the case of milk, however, pasteurization will render it entirely safe. Human beings who do get the disease commonly get it from direct contact with a sick animal. It is wisest, therefore, for people to keep away from all animals having the disease, unless they are properly provided with rubber gloves, coats, and boots, and these are thoroughly disinfected after each visit to the animals.

In the case of meat, as in the case of milk, it must be remembered that all herds which actually show the disease are quarantined, and neither milk nor meat from the sick animals can be sold. Sixty per cent. of the meat used in this country is produced in the nearly 900 federally-inspected slaughtering and packing establishments located in 240 cities. In these establishments no animal is slaughtered until it has passed an antemortem inspection and also a most rigid postmortem inspection by a veterinarian at the time of slaughter. After slaughter its meat cannot leave the establishment until it has been carefully examined and stamped "U. S. Inspected and Passed." In all these establishments no animal showing any symptoms whatever of foot-and-mouth disease is allowed to go to slaughter, and no meat which, on postmortem inspection, shows any suspicious symp-

toms of this complaint can be shipped out of the establishment. All meat suspected of coming from an animal suffering with this complaint is sent, under government seal, to the tanks to be rendered into fertilizer. The Federal inspection stamp on meat, therefore, means that it is entirely safe.

The Federal Government, however, has no jurisdiction over local slaughter-houses which do not ship meat outside of the State in which it is slaughtered. If, however, meat from such an animal did escape from one of these local slaughter-houses, which are purely under State or municipal control, all danger of its communicating the disease to human beings would be removed when it is thoroughly cooked and sterilized. Those who are located near an infected region and wish to be absolutely certain of the safety of their meat should cook it thoroughly.

The disease, when contracted by adults, is not usually a serious illness. It commonly takes the form of slight fever sores in the mouth, with shedding of the epithelium, and a slight eruption on the fingers. In the case of small or sickly children, it may take a more serious form, especially if complicated by other illnesses.

BERI-BERI

It is now established that beri-beri is of privatory origin, resulting from deficiency in the diet of a substance which is present in the aleurone layer of rice and soluble in water: from the researches of Funk, it appears to be a comparatively simple nitrogenous substance. The disease has this peculiarity: that it appears more among the well-nourished than the poor, also that by doubling the carbohydrate ration the rate of development was increased from two- to fourfold; the bulk of the starch and vitamine was shown to be digested and absorbed. In framing a dietary to obviate beri-beri, not only the absolute amount of protective foodstuff should be considered, but also the proportion which this bears to its calorific value.—(Report, June 20, 1914, *Brit. Med. Journal*.)

CANCER

It is estimated that about 300,000 cases of cancer exist in the United States, and that 80,000 die annually of the disease; one woman in every eight and one man in eleven over 35 years of age constitute

the death-toll exacted. So writes F. Dugdale (*Merck's Archives*, January, 1914, p. 1), and J. C. Bloodgood, of Johns Hopkins Hospital, says the proportion of cures of fully-developed cancer,—i.e., undoubted cases,—is small, but cures have been made, and the possibility of increasing their number is not infeasible. In the Johns Hopkins Hospital 80 per cent. of the cases that could be diagnosed only by exploratory incision or after operation were cured, while in the cases diagnosed as cancer by retraction of nipple or skin adhesion the proportion of cures, after five years, was 25 per cent., but both tumors were pathologically the same.

Serodiagnosis.—The work of Emil Abderhalden on the presence of "protective ferments" in animal blood has afforded a test of great value in the detection of cancer, which consists in testing the capacity of the blood-serum of the protected person to digest a given quantity of cancer protein. Great digestive powers indicate a diagnosis of malignancy, and weak action the reverse. C. B. Ball records 51 cases (*Jour. Amer. Med. Assn.*, lxii, 1914, p. 599), which he classifies as:

Cases	Positive	Negative
Clinically malignant	7	0
Suspiciously	20	8
Clinically non-malignant	4	12

All the 20 positive cases were verified later by X-rays, post-operative microscopy, and definite subsequent history. Although the action of the antibodies is in many ways similar to that evoked by bacterial infection, they differ in being essentially digestive ferments and working in the same way.

Serodiagnosis of Pregnancy and of Cancer.—The details of 100 cases examined by A. Leitch (*Brit. Med. Jour.*, Aug. 15, 1914) led him to the conclusion that the method was without diagnostic value.

Prophylaxis of Cancer.—Local lesions should be looked upon as an invitation to cancer, is the advice of W. J. Mayo (*Ann. of Surg.*, 1914, lix, p. 805), for all vertebrate animals suffer from cancer in situations affected by their habits or conditions of life, leading to local lesions in the protective mechanism. The prophylaxis of cancer depends on changing those habits and the early removal of precancerous lesions and sources of chronic irritation. Fifty per cent. of cancers on the kidney pelvis are superimposed on extensive renal calculi formation. In the appendix it usually occurs in association with

chronic obliterative processes; in the sigmoid and rectum the irritation in diverticula may be its cause, and, as cancer of the stomach occurs in 30 per cent. of all cancers in civilized man, but not in primitive races, it would seem that errors in cooking and eating must be responsible.

Cancer and Diet.—Many great surgeons, both Americans and Europeans, are now associating the development of cancer with diet, and Duncan Bulkley (*Med. Record*, Oct. 24, 1914, p. 699) endorses their decision and notes that accumulative evidence for years back points to excessive nitrogenous intake, combined with faulty cooking, as a prolific cause of cancer, while an absolutely vegetarian diet, with the exclusion of coffee and alcohol, in conjunction with proper medicinal measures, has often resulted in its disappearance. Visits to hospitals in Japan, Korea, China, the Philippines, India, Siam, and Egypt, which had a total of thousands of patients, had given a negative as to cancer cases, the disease being rare among these vegetarian peoples.

Mouse Cancer and the Gamma Rays.—Professor Wassermann records two remarkable experiments (*Deut. med. Woch.*, March, 1914), which he undertook with gamma mesothorium rays on mouse cancer; the first one to prove that these rays act directly on the tumor cells and not through the blood or other organic intermediary. An emulsion of the cells in Ringer's fluid kept at 37° C. retained its malignancy in other transplantation experiments for many hours, but, if exposed to mesothorium for three hours, quite failed to reproduce the original tumor in mice. Was the irradiated cell destroyed, or had the rays merely interfered in its function of malignant proliferation? He used the Neisser bioscopic methylene blue test, which, when in water solution, is reduced in the presence of living cells, and found the irrigated cells were just as potent to effect this reduction as the emulsion which had not been exposed. He concludes that radio-active substances act on carcinoma by virtue of their power to disturb malignant proliferation, and do not effectively destroy their physiological vitality.

TUBERCULOSIS

The Friedmann Treatment for Tuberculosis.—In the Hygienic Laboratory Bulletin No. 99, issued in October, 1914, Drs. John F. Anderson and Arthur M. Stimson find that the claims made by Dr. Friedmann for his method of treating tubercular infections are,

in brief, that, by means of injections of a living acid-fast organism, harmless of itself, he is able to cure cases of tuberculosis, pulmonary or otherwise, which have not already advanced to that hopeless stage where death is imminent. From the manner of presenting these claims and from the fact that successes only and not failures are reported, the reader of these claims is bound to assume that such results are the rule; in other words, that a sovereign remedy for tuberculosis has at length been discovered, and incidentally that a method has been devised for the administration of living acid-fast organisms which avoids abscess formation, a complication which has hitherto limited their employment.

The results of the investigation here reported do not confirm the claims made by Dr. Friedmann. They find, in brief, that the preparation used by him is not strictly devoid of dangerous properties of itself, still less so when injected into tuberculous subjects; that the favorable influencing of tuberculous processes by his methods is certainly not the rule, and that if we are to ascribe to the Friedmann treatment the improvement noted in a few cases, we are equally bound to impute to it the serious retrogression observed in other cases; and, finally, that the phenomenon of abscess formation has not been avoided by Dr. Friedmann's methods.

They find that the organism used by Dr. Friedmann differs in important cultural characteristics from any heretofore recognized tubercle bacillus.

The subcutaneous and intramuscular inoculation of animals with the Friedmann organism caused the formation of abscess in over 25 per cent. of the animals treated.

The treatment of animals with the Friedmann organism—rabbits and guinea-pigs—either before or subsequent to infection, with virulent tubercle bacilli, is followed, as a rule, by an increased susceptibility to the disease.

Inoculation of monkeys with the Friedmann culture did not show either curative or protective action in those animals against tuberculosis.

The claim of Dr. F. F. Friedmann to have originated a specific cure for tuberculosis is thus not substantiated by the investigation of Drs. Anderson and Stimson, and the claim that the inoculation of persons and animals with the organism used by him is without harmful possibilities is disproved.

Tuberculosis Statistics.—The returns are often rather puzzling, owing to the lack of reliable statistics, and F. M. Meader, director of the Division of Communicable Diseases, directs attention to the fact that, of the 7108 cases of tuberculosis reported for January to March, 1914, in New York State, 5218 were from New York City, Buffalo, Rochester, Syracuse, and Albany, taking one-fourth of the 1900 outside New York City. This is due either to greater accuracy of reports in the cities, or are there really two and one-half times as many in New York City as in the balance of the State?—(*N. Y. St. Jour. of Med.*, July, 1914, p. 382.)

With the quicker recognition of tuberculosis the number of "suspects" is increased and the cost of the warfare rises. At the present time about 200,000 die of tuberculosis annually in the United States, 50,000 of whom are children. That is the death-rate, but for every one who dies there are thousands spreading disease, which means about 12,000,000 persons mostly incapacitated and often dependent on local or government support. The conviction has been gradually strengthened that primary infection often occurs in infancy, and many developing the disease in adult life have carried it since childhood, so the energetic measures being carried on to render children healthy are among the most important.

Hoffman estimates the tuberculosis cases in the United States, covering all forms, to be about 1,500,000. Through modern sanitation and research the death-rate has been reduced from 389.1 in 1881 to 180.1 in 1912 per 100,000.—(*Pan-Amer. Med. and Surg. Jour.*, vol. i, No. 1, 1914, p. 50.)

Vital Statistics.—Very exhaustive inquiries into vital statistics among the tuberculous by W. Weinberg, of Stuttgart (*Tuberculosis*, April, 1914, p. 159), resulted in finding that the marriage risk in tuberculous wives (4000 cases) gave the death-rate in husbands 100 per cent. higher than that in a general population of equal age distribution; also, in the following up of 18,000 children of tuberculous parents from birth to the twentieth year, he estimated that 20 per cent. of all persons have tuberculous parents. Of children born in the last four weeks of tuberculous mothers, 16.7 per cent. were still-born and the remainder died under twenty years.

Tuberculosis and Immigrants, New Areas.—Dr. Hans Much (*Brit. Jour. of Tuber.*, January, 1914) attributes the remarkable

increase of tuberculosis in Palestine to the immigration of Russian Jews and the return of emigrants from America. Among the hundreds of thousands diseased, only about 25 per cent. react to tuberculin, in contrast with the 95 per cent. in Europe.

Vaccines in Tuberculosis.—The world-at-large is now well acquainted with the working of vaccines, but tuberculin with doctors has not had the consideration it demands. It is agreed among students of tuberculosis that no one is infected at birth, but 90 per cent. develop enough disease to react specifically with tuberculin, though 80 per cent. overcome the invasion. The children of tuberculous parents are, of course, the most susceptible, and, if such were rationally treated with tuberculin from an early age to adolescence, more chance of stamping out the disease would be in view. It has to be borne in mind that there would be the necessity of at least a yearly dosage as a prophylactic, or even every three months. Dr. Maragliano (*Berlin. klin. Woch.*, March 16, 1914) urges greater attention to the vaccine tuberculin, and gives his own experiences.—(*N. Y. State Jour. of Med.*, August, 1914, p. 418.)

Pulmonary Tuberculosis: Arneth's Method.—In addressing the Royal Society of Medicine, Dublin, Dr. J. A. Lindsay, in drawing special attention to *the threshold of disease*, spoke in favor of Arneth's diagnostic clue to tuberculosis, a method by which the latter marks the changes in the neutrophile leucocytes. He divides these cells into five groups, namely: "Where the cells have 1, 2, 3, 4, 5, or more nuclei. In health these groups form approximately 5, 35, 41, 17, and 2 per cent." . . . "In very early stages, when the general health is still unaffected, these groups preserve their normal ratio, but, with the first signs of general infection, this ratio is upset. The first rises to 15, the second to from 36 to 46 per cent., the third falling slightly, the fourth and fifth more decidedly." . . . "In the more advanced cases, with active symptoms, the first group rises from 28 to 52 per cent.; the second from 37 to 53; the third falls to 10 per cent., while the fourth and fifth tend to disappear altogether." Arneth claims that this method gives accurate indication of intensity of infection and reaction of the patient's organism. "In favorable cases the condition of the neutrophile leucocytes tends to revert to normal."

Tuberculous Meningitis: Its Curability.—There is a hopeful note sounded by J. v. Bokay (*Jahrb. für Kinderheilkunde*, August, 1914)

concerning the cure of tuberculous meningitis, hitherto deemed incurable. He gives a table of 34 recoveries from the literature, and three of his own. None was found in children under two years of age, the proportion increasing from five years, but only ten per cent. were in children over seven. The recoveries were mostly in cases where tuberculosis was limited to the meninges, not involving other organs, and showing no marked tubercle formation.

The quickest road to recovery is the surgical one of trephination and drainage. In cases showing recovery after Quincke's lumbar puncture v. Bokay attributes the improvement as much to natural resistance of the body as to treatment.

Artificial Pneumothorax.—Dr. Lyon, in recording his experiences of the value of artificial pneumothorax in pulmonary tuberculosis (*Boston Med. and Surg. Jour.*, Aug. 25, 1914), obtained the best results in unilateral cases in which pleural adhesions had not formed. Patients with bilateral disease, in whom the active disease in the untreated side is limited to the apex, will often show satisfactory improvement, but not so with those who are diseased beyond this point. The replacing of a tuberculous pleural effusion by sterile nitrogen gas will prevent the re-accumulation of the fluid.

SYPHILIS

Syphilis and Salvarsan.—At the July meeting of the British Medical Association, J. E. R. McDonagh, speaking of syphilis and salvarsan, said that, in his opinion, the *Spirochaeta pallida* was not the actual cause of syphilis, but only the adult male of a complicated life-cycle. There is also a female, and spores result from the fertilization of the female cell by the *Spirochaeta pallida*. The adult sexual bodies are the main cause of symptoms, the spore the cause of disease. Salvarsan will kill the spores in the earliest stages of disease, but is without effect in the late ones. In the latter the symptoms vanish, not from destruction of the spores, but from that of the ripe gametes to which the spores give rise, so a quick reinfection takes place. A combined arsenical-mercurial treatment will cure many cases in very early stages; in the primary stages, five injections of neosalvarsan and mercury for a year. In over 4000 patients this has had no bad after-effect.

Major L. W. Harrison, of London, reported immediate good re-

sults from salvarsan in 4000 cases treated in the British Army, and experience had led him to look upon combining mercury with salvarsan as the wisest course.

Crawford Treasure thought the conclusions of many writers made it difficult to believe in any real cure of syphilis. The Wassermann reaction was inconclusive, examination of cerebrospinal fluid equally so, and cases of nervous disease arose even after vegetative reactions had been shown.

Henry McCormac found the formula of Desmoulière to be more delicate than any other antigen. His plan was to give three injections of salvarsan, followed by two years of mercurial treatment.

Dr. Nixon hoped the substance hidden under the names of antigen, complement, and antibody would be subjected to careful chemical and physical analysis, as at present they only carried our ignorance a step farther under a cloak of apparently increased knowledge.

Neisser's view of the ideal drug is one which would combine arsenic, as in salvarsan, with mercury, which would be made still more powerful by the addition of antimony, which has a destructive action on the spirillosis of animals.

A substance, "antilutin," has recently been introduced by Tsuzuki, which is a compound of antimony oxide with potassium tartrate and ammonium, administered hypodermically in solution, about three grains being used in divided doses over a period of four days.

Syphilis and the Wassermann Reaction.—"How shall the clinician interpret the Wassermann reaction?" asks W. H. MacKinney (*Ann. of Surgery*, September, 1914), deciding that to interpret a positive reaction as an indication of syphilis is erroneous, to reject the test altogether equally so, and the only successful way is a careful study, in every case of syphilis, of many reactions made by different serologists, as the reaction offers the possibility of so many errors in technic and reagents calling for a uniformity in technic and a standardization of reagents.

Syphilis and the Wassermann Test.—Doctors, because of faulty training in hospitals, often fail to recognize syphilis when it is kept clean or even aseptic, as in the middle and upper classes, though he is probably familiar with the manifestations of septic syphilis seen at the hospital. If the Wassermann test is negative, syphilis is deemed absent, but if a specimen of the patient's serum be sent to several

pathologists, opinions may differ, therefore several opinions should be taken. In the tertiary stage the blood reaction is positive, and the *Spirochæta pallida* has been shown to exist in gummata (*Lancet*, Aug. 22, 1914, p. 492). The latter observation is, says Dr. Edred M. Corner, very important, because it has hitherto been taught that the tertiary stage is not contagious, but if the *Spirochæta pallida* be present it must be. Among the better class patients the primary sore may be easily overlooked; the secondary signs are sparse, and only a proportion of the sufferers get gummata, so the transmission of the disease may go unchecked.

Examination of Syphilitic Families.—Wilhelm Raven gives the result of clinical and serological investigations of 117 syphilitic families, and urges the utility of so doing. In as many of the parents and children traced a thorough examination was made, and not more than 27 members of the 117 families were completely normal. Evidence pointed that the more severe the infection in the parents, so is it less in the children, though Hochsinger and others do not find it so. The writer concludes that Spirochæta carriers are actively infective and should be treated.—(*Lancet*, July 11, 1914, p. 111.)

The necessity of cerebrospinal examinations in "cured" syphilis is urged by B. C. Corbus (*Jour. Amer. Med. Assn.*, Aug. 15, 1914, p. 550). He finds that since the application of lumbar puncture with spinal fluid examinations many cases showing a negative blood-serum Wassermann from 18 months to two years without treatment show subarachnoid involvement. He gives his tests made since October, 1913, and found spinal fluid involvement in 18.3 per cent. Based on clinical observation, there is a strong possibility of a specific spirochæta for the nervous system.

John A. Fordyce (*op. cit.*), in speaking of treatment of syphilis of the nervous system, believes the intraspinal method has placed the treatment on a more accurate and scientific basis. He advocates the injection of incorporating salvarsan with human serum direct *in vitro*. The serum should be used within three hours of being made up. The limits of a safe dose lie within 0.5 mg.

Cerebral Syphilis.—The treatment of syphilis of the nervous system is now, as always, a very unsatisfactory procedure, and the latest proposal, to inject salvarsan or some substitute for it into the spinal canal or subdural space, is being followed in various ways. The

results obtained by different men are well shown by recent articles dealing with the question. Some clinicians are most enthusiastic about the results of using salvarsan intravenously, then, in twenty minutes, withdrawing blood, setting it aside in the cold to coagulate, diluting the serum so obtained with saline, and injecting the resulting solution into the spinal canal. Others tell us that the serum must never be used if withdrawn longer than three hours from the body. Some have claimed especial benefit to follow the use of salvarsanized serum that had been incubated at 56° before use. Investigations by Professor Benedict, Cornell Medical School (B. Sachs, I. Strauss, and D. J. Kaliski, *Am. Jour. Med. Sci.*, November), seem to show that the spinal fluid receives at least as much arsenic by an intravenous injection of salvarsan as by intraspinal injection of the serum as usually given after such an intravenous injection. The combination treatment of mercurial injections in more or less frequent alternation with intravenous injections of salvarsan or neosalvarsan probably gives better results and has fewer objections to it than any other. In this connection the same authors state that the contraindications formerly thought to exist regarding the use of salvarsan are now reduced to the following: severe renal involvement, very marked cardiac disease with insufficiency of the cardiac muscle, impending coma in diabetes or nephritis, terminal conditions which are not likely to be benefited by the drug, and a known intolerance to it. Tabes has yielded to a marked degree in many instances, and progressing cases can usually be brought to a standstill, but no method yet known has such an effect in general paresis. It appears to be obstinately progressive in spite of all treatment.

Syphilitic Origin of Disease.—"Stop—look—listen" for a syphilitic origin of disease seems, to-day, to be the watchword in medical practice. Dr. Hunk (*Amer. Jour. Med. Sci.*, August, 1914, p. 157) gives a warning that syphilitic spondylitis and perispondylitis, while rare, should be carefully looked for as factors in every case of acute or chronic vertebral disease. Sometimes the onset is sudden, seeming to be a sharp attack of rheumatism, or, developing gradually, it may become chronic. Dr. Hunt, after an analysis of 50 cases, found 25 per cent. associated with complications referable to the nervous system, either in the nerve-roots or in the spine itself. If located in the cervical region, lues should be suspected, for one-half of cases recorded are in this region.

The Luetin Test.—Early experience with luetin showed a reaction more uniformly present in chronic cases of syphilis than in primary or secondary forms. In congenital syphilis a positive reaction is more frequently found in late than in new-born cases, and the observations of some 50 investigators afford the following statistics of the luetin reaction: in primary syphilis, present in 30 per cent. and, usually, very mild; in secondary, in 47 per cent., also mild; in tertiary, in about 80 per cent., severe and, usually, pustular; in general paralysis and tabes, in 60 per cent.; in congenital syphilis, in about 70 per cent. Among the non-syphilitics there was no reaction. Hideyo Noguchi (*N. Y. Med. Jour.*, Aug. 22, 1914) gives his experiences in the practical application of the test in the journal mentioned.

PELLAGRA

According to the report of the Thompson-McFadden Commission, June, 1914: (1) The supposition that the ingestion of good or spoiled maize is the essential cause of pellagra is not supported by their study. (2) Pellagra is, in all probability, a specific infectious disease communicable from person to person by means at present unknown. (3) They have discovered no evidence incriminating flies of the genus *Simulium* in the causation of pellagra, except their universal distribution throughout the area studied. If it is distributed by a blood-sucking insect, *Stomoxys calcitrans* would appear to be the most probable carrier. (4) They are inclined to regard intimate association in the household and the contamination of food with the excretions of pellagrins as possible modes of distribution of the disease.

The findings of the Thompson-McFadden Pellagra Commission (Drs. J. P. Siler, P. E. Garrison, and W. J. MacNeal) are: (1) No definite connection between occupation and its occurrence has been proved, save that its higher mortality in women and children points to the home as a place of contraction. (2) Evidence of a close association with a preexisting case was shown in more than 80 per cent. (3) A house-to-house visit in an affected neighborhood (some 5000 people) failed to associate the disease with dietary. (4) Flies of the genus *Simulium* have nothing to do with it. Animal inoculations and the study of intestinal bacteria have not yielded conclusive results. (5) Blood studies have not disclosed any constant abnormality characteristic of pellagra. (6) There is no evidence of heredity. (7) Re-

currence is frequent.—(*Jour. Amer. Med. Assn.*, Sept. 26, 1914, p. 1093.)

The report by Dr. Harris (*Jour. Amer. Med. Assn.*, June 21, 1913, p. 1948) that he had produced pellagra in the rhesus monkey by the inoculation of a Berkefeld filtrate derived from human lesions made former State investigators with negative findings resume work at the United States Public Health Service, Savannah, Ga., but in 103 experiments, including 77 rhesus monkeys, Java monkeys, and female baboons, only twelve died of causes undetermined, so that no inference as to communicability of the disease can be made.

Dr. Carl Voegtlin (56th Session A. M. A., Atlantic City, June, 1914), of the Public Health Service, Washington, D. C., said that three points to be considered, in view of poverty and pellagra flourishing together, were: (1) Deficiency or absence of vitamines in diet; (2) the toxic effects of some substance, such as the soluble salt of aluminum, which occur in food; and, (3) a deficiency of the diet in certain amino-acids.—(*J. A. M. A.*, June 26, 1914, p. 1096.)

CHOLERA

In the domain of epidemiology and the prophylaxis of cholera, Viole (Paris Médicale, August, 1914, p. 208), as cited by Charles Dopter, has a new view concerning the pathogenesis of human cholera. He says the cholera vibron is primarily developed only in a determined zone in the intestine, and if this zone is freed of all biliary juice the vibron will not develop.

BUBONIC PLAGUE

According to R. H. Creel (*Public Health Reports*, July 17, 1914), one of the most important factors is the effectiveness of laboratory examination in detecting plague rats. If the rodent population has also been diminished 50 to 75 per cent., it would seem a community can reasonably be considered free one year after the last plague rat has been reported.

LEPROSY

Dr. Isadore Dyer (*Amer. Jour. of Tropical Diseases and Preventive Med.*, vol. i, No. 6, 1914) deplores the lack of interest displayed by members of Congress concerning the spread of leprosy in the

United States. The disease is common in some of the foreign possessions (5000 in the Philippines), and Colombia, of which the Panama Canal Zone once formed a part, was found, as the result of an inquiry, to have about 20,000.

It is suggested that European populations are once again exposed to danger, and Marchoux, of the Pasteur Institute (*Monde Médicale*, May, 1914, p. 158), is carrying out his studies on rat leprosy, the microorganism of human leprosy being difficult to cultivate. The specific bacillus is a fragile germ, easily inoculable in amenable subjects. In this instance the disease is not transmitted by stinging insects through flies, though the Sarcoptera and Demodex may contribute to its spread. Confirmed leprosy is very rare in comparison with latent, abortive cases, which may be unsuspected until the death of the patient or undergo transformation into confirmed leprosy under the influence of secondary infections. Latent leprosy may also undergo spontaneous cure.

The foci of the disease are already recognized at all four points of the compass—Minnesota, New York, California, Louisiana, and Texas—and sporadic cases elsewhere (three new areas of infection). There is a bill before the House (introduced by W. Lafferty, in 1913) asking for the institution of a national leprosarium, and, meanwhile, leprosy increases.

DIPHTHERIA

Diphtheria and Antitoxic Serum.—Success in treating 339 diphtheritic patients by intramuscular injection of antitoxic serum has justified J. D. Rolleston and C. MacLeod (*British Journal of Children's Diseases*, vol. xi, 1914) in publishing their method. The outer side of the thigh in its middle third is painted with a 2 per cent. solution of iodine, the needle driven to some depth in the body of the *vastus externus*, and the injection given in the ordinary way. Young children can easily stand 20,000 units or 50 Cc. After the withdrawal of the needle the puncture is again painted with iodine and a collodion dressing put on.

Lumbago and Manipulation.—The extreme reluctance of any one afflicted with lumbago to be touched or moved is well known, but W. Haig (*Brit. Med. Jour.*, Sept. 26, 1914), believing the sudden onset of acute lumbago is mechanical and similar to a "crick" in the knee,

treated his patients to deep thumbing of the lumbar muscles, and making them perform rotary, lateral, and dorsal flexion movements. A painful area is usually discovered in either the middle line or on one side, and he fixed the part of the vertebral columns below this painful region by firm pressure of the thumb on each side of the spine before manipulation. In every case the patient was able to return to work.

Venereal Prophylaxis.—The Premier of Victoria received a lay deputation (*Lancet*, July 11, 1914, p. 123) asking that measures should be taken for the provision of treatment of venereal disease and the detention of prisoners until they were cured. A promise was made by the Premier to continue the provision of free Wassermann tests.

Congenital Malaria.—Until quite recently the idea of congenital malaria was not generally entertained, but M. H. Bass (*Arch. of Pediatrics*, April, 1914, p. 250) gives four cases from the literature and one of his own. In all five the mother had suffered from malaria, and one child, born prematurely, had malarial parasites in the blood. These were also found in the case of two other babies who, born apparently healthy, died of fever within 17 days. In Dr. Bass's own case the child, though born healthy, became ill at three weeks with vomiting and undigested motions. After death at seven and one-half weeks the tertian type of haemameba was found in the blood.

The Danger in Too Rapid Reduction of Obesity.—That adipose tissue is capable of absorbing certain toxic substances produced in the body, and excessive reduction in fat may liberate these into the system, is an opinion advanced by C. Fiessinger (*Bull. de l'Acad. de Méd.*, Oct. 6, 1914), because he has noted nervous exhaustion, mental depression, nervous dyspepsia, vertigo, insomnia, chronic rheumatism, gout, eczema, interstitial nephritis and pulmonary tuberculosis. Of 145 cases of heart-weakness where fat was reduced, 15 showed bad symptoms, but adverse symptoms in nearly all cases cleared up when the patient was allowed to regain some five or six kilogrammes of fat.

BLOOD-PRESSURE IN PNEUMONIA

The study of the blood-pressure in pneumonia is now so universal, and the resulting readings so constantly used in forming our prognosis in this disease, if not also guiding our treatment, at various

stages, that an article questioning its value is a surprise to most of us. L. H. Newburgh (*Amer. Jr. Med. Sci.*, February, 1915) quotes Weigert's clinical observations, leading him to conclude that dependence cannot be placed on the pressure, and gives the result of some experiments that tend to confirm this view (that the vasomotor apparatus is not impaired in pneumonia).

HYPERTHYROIDISM

Hyperthyroidism, the now well-known symptom-complex that has attracted so much attention under the names of Graves's disease, Basedow's disease, exophthalmic goitre, etc., and which so commonly requires removal of a large part of the thyroid gland for its relief, is the subject of a masterly paper by S. P. Beebe, Ph.D., M.D., in *Journal of the American Medical Association*, January 30, 1915. Going at some length into the reasons for supposing that a substance elaborated by an overacting thyroid gland is the cause of most of the symptoms, he details some laboratory experiments in the production of bodies antagonistic to various secreting organs, kidneys, liver, lymphatic glands, and thyroid by extracting them from these organs. Human thyroids are used to prepare a substance, which is then given by intraperitoneal injection to sheep, at weekly intervals and in decreasing doses. After six injections the animals are bled, the serum collected, filtered, and tested. This serum is used in treating cases of hyperthyroidism, but the directions are so important that those interested are referred to the article. In the paper Dr. Beebe notes the fact, surprising to him, that men of supposed good judgment should rely exclusively on such a remedy as this serum, neglecting, during its use, such means as rest, freedom from annoyance, regulated diet—in fact, each and all of the other and well-tried remedies now at our command. In treating this trouble we cannot be too comprehensive nor too thorough. In some cases operation must be resorted to, but he feels that there has been much needless surgery in the past, and feels, too, that it is better practice to enable the patient to recover and keep the gland than to remove it to effect the same end. Hypoactivity of the portion left may develop later, and complete relief from this cannot be obtained by the simple administration of thyroid extract. The treatment has been used in more than 3000 cases, ranging from mild to severe, and fifty per cent. have been cured in

the sense that they are strong and able to meet all the demands made on them. Thirty per cent. show more reaction to unusual strain or emotion than normal people do, but not to the usual demands of life. The remaining twenty per cent. includes cases that have not been so much benefited, those that have died, and those that have been operated on. The number of fatal cases, after six months of serum treatment, is very small.

SKIN DISEASES AND CARDIAC LESIONS

It seems obvious, from the mass of evidence adduced, after long research and experience by David Walsh (*Med. Review*, February, 1914, p. 44), that a certain proportion of chronic and recurrent skin diseases must be associated with grave cardiac trouble, since hospital records show such trouble to coexist in dermatological patients. In all cases of delayed healing of the skin from moderate traumatism of any kind—mechanical, thermal, or septic—the state of the heart should be carefully investigated. In some cases the development of an acute cutaneous malady, such as a sun dermatitis, may afford delicate clinical evidence of failure of cardiac compensation, or a similar process of impaired or pathologic reaction to traumatism may be duplicated in the deep tissues of the body as well as on the visible skin, and inadequacy of the capillary circulation may explain the development of various acute, chronic, and recurrent diseases of internal organs following internal traumatism, cancer possibly falling within the category. The administration of drugs such as mercury, which is a tissue irritant, should be delayed until the possession of a normal or fully compensated central circulation is ascertained.

Tick Paralysis in Man and Animals.—Dr. I. U. P. Temple, of Oregon (*Lancet*, June 27, 1914, p. 1823), gives thirteen cases of this disease: three fatal. Only children are seriously affected. The tick bite was in each case followed by more or less rapid acute ascending paralysis. The parasite is known as the *Dermacentor venustus*.

DEMENTIA PRÆCOX

Recent medical research has demonstrated microscopic changes in the brain in dementia præcox. E. Frankhauser, commenting on this (*Corres. Blatt für Schweizer Aerzte*, Basel, Jan. 3, 1914), says the

changes are the work of abnormal functioning on the part of certain of the ductless glands, especially the thyroid and the genital. The blood picture also seems to be modified, and possibly also the lymphatic organs.

Purpura Hemorrhagica and Blood Injection.—Subcutaneous injection of pure blood from a healthy subject for purpura hemorrhagica has been used successfully by C. C. Howard, of Glasgow (*Kentucky Med. Jour.*, Oct. 1, 1914). Twenty-eight cubic centimetres of blood were taken from the arm of a young man and quickly put into the subcutaneous tissue of the hip, causing the hemorrhage to almost cease within 24 hours. Next day 55 Cc. from two healthy young men were used, and within 24 more hours the flow had entirely stopped. The fourth day two more donors gave 80 Cc.; on the sixth day 90 Cc. from two more were injected. The patient's pulse thereafter was 80, with a normal temperature. Occasional blood sometimes stained the septum, but small doses of iodides were given to aid absorption. Three months later he seemed well and had gained 30 pounds in weight.

Arteriosclerosis.—At the Battle Creek Conference on Race Betterment, 1914, Louis F. Bishop pointed out that the mortality from arteriosclerosis is more than double what it was 30 years ago. In 1910 100,000 died of circulatory disease in the United States. The cure is avoidance of nervous strain, a study of food relations, and the institution of a healthy, strict régime.

HIGH BLOOD-PRESSURE

The question of high blood-pressure, its significance and the treatment indicated, is gradually unfolding itself, and the article of W. Duffield Robinson in *Merck's Archives* for December should be read in full. He recommends pilocarpine in doses of one-thirtieth of a grain or less before meals in half a tumbler of water in those cases in which a reduction seems advisable. The negro race does not tolerate the drug at all well. The action of pilocarpine is explained most clearly. He feels that the lack of popularity of this drug is owing, in part, at least, to the large doses in which it is commonly used. The question of high blood-pressure is considered from another standpoint, that of treatment by electricity, by Dr. A. B. Hirsh (*Penna. Med. Jour.*, December, 1914). By the systematic use of the high-frequency current a "molecular massage," as one of the men discussing the paper

described it, is effected, the capillary resistance to the blood current lessened, the heart action steadied, and the cases reported show it to be a remedy of peculiar value when administered by an expert. In the same journal Dr. David Riesman considers the question of hypertension under four clinical divisions: (1) Hypertension with demonstrable nephritis. (2) Hypertension with demonstrable arteriosclerosis. (3) A combination of (1) and (2). (4) Hypertension without either manifest disease of the arteries or manifest nephritis. In groups (1) and (3) the prognosis is bad, inasmuch as intercurrent diseases are badly borne. In group (2) the most frequent cause is syphilis, and treatment directed to that disease may influence them favorably, but apoplexy, aneurism, angina pectoris, and cardiac failure threaten them. In group (4), so long as the heart-sounds are good and the kidneys efficient, the prognosis is good. Tobacco is objectionable, the food intake is usually too great, numerous short vacations rather than a single long one are of benefit. The cause of the hypertension appears to be a chemical, not yet distinguished, and possibly a beneficial one elaborated in excessive quantity.

Blood Transfusion: Determining Quantity.—It is, as E. Libman and R. Ottenberg point out, as necessary to control the amount of blood transferred as to control the dosage in any other therapeutic procedure (*Jour. Amer. Med. Assn.*, March 7, 1914), and they give an arithmetical formula by which it is possible to calculate how much rise in the percentage of hæmoglobin will be obtained by transfusion of a given volume of blood: Patient's blood weight \times patient's hæmoglobin per cent. + weight of blood transfused \times donor's hæmoglobin per cent. = hæmoglobin per cent. reached, transfused (in pounds).

The patient's blood weight is estimated at one-nineteenth of the body weight. It is always safe to take one-fourth of the donor's blood.

Hæmophilia.—There has always been difficulty in the smallest operation on hæmophiliacs, but M. H. Vegas (*N. Y. Med. Jour.*, Sept. 19, 1914, p. 549) expresses a belief that operative surgery need not be abandoned if several subcutaneous injections of freshly-prepared rabbit serum are given in advance. He himself had a case in his own clinic—a boy of seven, who, after four months' serum treatment, was completely cured of a hemorrhagic arthritis. The mother had profuse hemorrhages, and two of his younger sisters had died of hemorrhage. Pasalacqua, a foremost writer on hæmophiliac sero-

therapy, uses 15 Cc. of fresh serum taken aseptically from the carotid artery, injected into the veins, or doses of 30 Cc. for subcutaneous injections, with, sometimes, another injection two days later. The dose is halved for children, and ox serum prohibited, as it causes high fever, vomiting, chills, and cyanosis. The rabbit serum is used in all cases, even where operations are not contemplated.

Hemorrhagic Diseases in the New-born.—A newly-born who had, three days after, bleeding from the vagina and gums, with a temperature of 103° F. on the fifth day, was treated with human serum by J. E. Welch (*N. Y. State Jour. of Med.*, xiii, 1913, p. 88); one ounce was given hypodermically and repeated twice daily for four days, with rapid recovery.

Suture of the Heart.—The Obuchow Hospital (Russia) reports, through H. Fowelin (*St. Petersburgher Med. Zeit.*, xxiv, No. 12, 1914, p. 147), 28 cases of heart suture with eight recoveries under different surgeons. Fowelin did not attempt drainage in one of his own cases, and he attributes death, nine weeks later, to complications which might have been avoided.—(*J. A. M. A.*, Aug. 15, 1914, p. 616.)

Duodenal Alimentation.—Particularly in cases of gastric and of duodenal ulcer this procedure appears to have no satisfactory substitute. In *American Journal of Medical Science*, September, 1914, William Gerry Morgan, of Washington, gives his views on the subject. In gastropostis and gastrectasia it seems to show brilliant results, in inoperable pyloric cancer a measure of relief may be looked for, and in treating amœbic dysentery ipecac, through the tube, in conjunction with emetine hypodermically, seems more satisfactory than either method alone. Einhorn's apparatus is the one that has been used. The food is introduced warm slowly, and the choice is milk, raw egg, and sugar of milk. After each feeding a syringeful of water and then one of air are gently forced through to insure the tube remaining patent. (George O. Jarvis and Albert Abrams have recently invented a method that greatly facilitates the introduction of the duodenal tube, pyloric dilatation being induced by concussion of the fifth and sixth thoracic vertebrae after the introduction of the tube into the stomach. During the few moments that it persists the tube can be readily passed through. This avoids the bucket and the delay incident to the older method.—*Ed.*)

Vulvovaginitis in Children.—Young children are frequently found to suffer from a vulvovaginal discharge, and the source of the trouble has long been a puzzle. Fred J. Taussig (*Am. Jour. Med. Sci.*, October) has apparently solved the question, and outlines the treatment needed. His deductions are that in children, before puberty, the female genitals are of an open formation and favor the infection from any soiled contact. These children, in using toilets in schools, are forced to lift themselves with some effort to the seat adapted to older persons, not rarely find the seat slightly soiled by the previous occupant, and thus the infection is accomplished. Investigation with this possibility in mind confirmed the theory. The seats were frequently found to be contaminated, and usually so high that only a well-grown child could reach them without effort. The symptoms are not marked—slightly painful micturition at first, then merely a persistent vaginal discharge; the course of the disease very long, as a rule. Treatment consists of complete rest in bed during the acute stage, the administration of from one to four grains of hexamethylamine, t.i.d., and instillation of 25 per cent. argyrol. Dry powders and douches are inadmissible on account of the rugæ. After two weeks of this treatment, daily instillations of one per cent. nitrate of silver, fifth and sixth week two per cent. solution, seventh to tenth week four per cent. solution, at first twice, then once weekly. An ordinary small rubber-tipped urethral syringe was used. When possible to do so, send to the country for a month or two without treatment, when the discharge has been absent for a month. Any form of treatment will fail if parents do not faithfully carry it out, and in this affection they are very prone to lose interest long before a cure is accomplished. Prevention is more important than cure, and the only practical suggestion seems to be that the schools be provided with a low toilet with a U-shaped seat.

FOLLICULITIS

Seeing that urologic interest centres more on the prostate and seminal vessels, practically excluding the verumontanum of colliculus, P. E. McCown (*Indianapolis Med. Jour.*, September, 1914, p. 387) calls attention to the scanty literature on the subject and gives the formula he has found most efficacious in curing. The galvanocautery and the Oudin current are good, especially where cysts are present;

irrigation of potassium permanganate or silver nitrate in purulent conditions, then, as the suppurative process recedes, posterior urethral instillation of silver will relieve the other symptoms; the direct application of silver nitrate through the endoscope. When cysts are present they may be ruptured and removed by the knife or snare and their bases cauterized. Treatments are given at five to ten days' interval. In chronic or atrophic forms it is more prolonged, while dilatation with sounds and the Kollman dilator, followed by intravesical irrigations, seems to give the most reliable results.

THE TREATMENT OF SCIATICA

In the experience of F. X. Dercum (*Therapeutic Gaz.*, April 15, 1914) he has found the following to give great relief: Rest in bed; 10 to 20 grammes of sodium salicylate, together with 20 to 30 grammes of sodium bromide every four hours. These large doses must be given for 24 or 48 hours, when the dose may be reduced one-half and rapidly discontinued. In order to prevent contractures, movements of the leg should be practised after subsidence of acute pain, and massage and electricity are of value in maintaining nutrition during the prolonged rest.

Fatal Pneumonia and the Vasomotor Centre.—Recent experimental evidence has shown that there is no impairment of the vasomotor centre in fatal pneumonia. There was a normal vasomotor reflex, with, practically, wholly consolidated lungs, in animals about to die. The *Pneumococcus Fränkel* was used for rabbits, and the *Streptococcus mucosus* (*pseudopneumococcus*, *pneumococcus mucosus*) for dogs, cats, and rabbits. The experiments were conducted by W. T. Porter and L. H. and I. Newburgh.—(*Amer. Jour. Physiol.*, August, 1914, p. 1.)

Biologic Relations between Mother and Child.—Two writers, R. v. Vellenberg and A. Döll (*Zeit. f. Geburt. und Gyn.*, lxxv, January, 1914), after exhaustive studies as to whether the mother's antibodies, etc., pass to the foetus or the nursing child, have found nothing to support this theory. The foetus is an individual entity, with cell chemistry complete.

Urticaria.—It has been found by A. Eustis (*N. Orleans Med. and Surg. Jour.*, lxvi, 1914, p. 730) that the introduction of a very small amount of betaimidazolylethylamin (derived from the amino-acid

histidine) through a skin abrasion quickly produces an œdema resembling urticaria, and he assumes that the formation of betaimidazolylethylamin in the gastro-enteric tract may be at the root of urticaria of alimentary origin, therefore a rational dietotherapy is then necessary. In these cases he has had favorable results from purgative treatment with temporary abstinence from diet-free protein. Frequent examination of the urine for indican will reveal the amount of intestinal toxæmia, and the presence of indican can be used as a guide to the allowance of amin-yielding products in the diet.

THYROID

Graves's Disease.—The milk of a thyroidectomized woman who had had an operation on the thyroid and the gland removed, and who had lost her four-days-old infant, was given to the sister of the woman, who also suffered from Graves's disease. For four months the milk was drawn off and given each time to the sister by mouth. The goitre became smaller, exophthalmus almost entirely disappeared, the pulse-rate and heart action became normal. The case is quoted by Pychlau (*Deut. med. Woch.*, 1913, No. 47).

Goitre and the Ovaries.—Professor Mannaberg (*Wien. klin. Woch.*, 1913, vol. xxvi, p. 693) believes in a close physiologic relation between the thyroid and the ovaries, and in ten cases of exophthalmic goitre he has used the X-rays in the ovarian regions with marked subjective improvement in all and reduction of the exophthalmus in five. The neck did not decrease in size, but the patients were able to return to work.

Hypothyroidism.—The recognition of the effects of partial suppression of thyroid secretion has been pointed out by E. Hertoghe, of Antwerp (*Lancet*, July 4, 1914, p. 42). From a series of studies during twenty years he is able to show that no cell in the body can reach morphological perfection without thyroid stimulus, and its great influence on menstruation, pregnancy, and lactation. Hypothyroidism produces infiltration of every tissue, causing, in muscles, painful contractions; in nerves, neuralgic pains; in the central nervous system, migraine, vertigo, tinnitus, or even unconsciousness, defective memory, and coma.

INTRAVENOUS NUTRITION

By giving completely-digested proteins and non-nitrogenous food-stuffs by intravenous injection by way of the jugular vein or through a splenic vein, V. Henriques and A. C. Andersen (*Zeitschr. f. physiol. Chem.*, No. lxxxviii, 1913; *Ibid.*, No. xcii, 1914) found they could keep animals alive for a fairly long period. They have continued their experiments on animals from which the whole enteric tract, from duodenum to rectum, has been surgically removed, life being prolonged sufficiently to prove that real nutritive or synthetic functions can be carried on quite independently of the bowel. The nitrogen in the solutions was given essentially in the form of amino-acids, thereby demonstrating their significance in the digestive functions and the possibility of a protein synthesis within the tissues themselves. It is found that, though amino-acid mixtures are easily tolerated by intravenous injection and assimilated, partially-digested proteins,—*i.e.*, proteoses and peptones,—are toxic when so introduced; also, native proteins—casein, white of egg, and inactive homologous serum—fail in nutritive requirements, although the serum is not so toxic as the other proteins. Rapid excretion by way of the kidneys shows the foreign character of even some purest proteins injected directly into the blood stream.

BLOOD TRANSFUSION

For experimental work in blood transfusion, H. S. Satterlee and R. S. Hooker (*Jour. Amer. Med. Assn.*, lxii, 1914, p. 1781) have substituted herudin for paraffin, believing the former to exert an antagonistic action on fibrin formation by combining with thrombo-plastin in the form of an antibody. A 1 to 500 solution was used to coat the syringe, and excellent results were obtained by previously coating the pipette and shoulder of the syringe with paraffin before using the herudin, the tip being carefully kept free from tissue juices.

Pemphigus and Blood Transfusion.—A single intravenous injection of 20 Cc. of non-defibrinated, fresh, normal human serum effected a cure in a severe pemphigus of eight months' standing, when salvarsan and all other methods had failed. The blood, says the operator, G. Praetorius (*Münch. med. Woch.*, April 22, 1914), was taken from the patient's husband. On the sixth day the eruption had disappeared, and after eight months there had been no return.

TRANSPLANTATION OF ORGANS

At the triennial meeting of the International Surgical Association, Alexis Carrel summed up the present position of transplantatory surgery: "During the last few years it has been definitely established that autoplastic transplantations of organs are practically always successful; homoplastic, though the immediate results may be excellent, are nearly always ultimately unsuccessful, and heteroplastic always so." The present aspect of the problem is to find out the causes of the reaction against a new organ and to discover how this may be prevented, and this, James B. Murphy, Carrel's co-laborer, thinks, can be done by lessening the activity of the lymphoid tissue, as this seems to constitute a barrier. This has been done in two ways, by the use of subcutaneous injections of benzol and by the X-rays. The chick embryo, which lacks the lymphoid tissue, was found to be an excellent medium for heteroplasticity, but if supplied with a graft of either adult chicken-spleen or bone-marrow it became immune.—(Laboratory paper, Rockefeller Institute, 1914.)

The fact has been established by Borst and Enderlen that only those organs are preserved which have been removed from an animal and there re-planted shortly after, for the highly-differentiated tissue of organs always disintegrates. Erich Lexner, in quoting various opinions (*Ann. of Surg.*, August, 1914), added that the idea of Sauerbruch of parabiosis (union of two similar animals by means of arterial and venous anastomosis) in order to mix the bloods to supply the homoplastic implanted organ in the recipient with the nutritive substances of the donor has yielded no results.

Only the organs with internal secretions, the ductless glands, functioned after transplantation (epithelial cells, thyroid gland), but this function did not persist, in that it remained only so long as the important substances were secreted from the slowly-disappearing grafts.

Ovarian Autografts in Women.—De Rouville, though concluding that the subject of ovarian autografts needs much more study before success can be obtained, and though he had only one successful case out of nine, is optimistic as to the future of the operation. The graft was put under the abdominal skin, where its changes were visible and palpable, but he notes that an ovary apparently retaining

normal size may be quite atrophic and made up of fibrous tissue. The ovary usually swelled from five to twelve days before menstruation and was painful. It is open to doubt whether a grafted ovary, after a bilateral oophorectomy, really maintains menstruation, for pregnancy has followed such operation even when grafting was not done. The microscopic examination of the ovary was made only once, when the still living ovary was obviously beginning to degenerate.—(*Arch. Mens. d'Obst. et de Gyn.*, February, 1914.)

Thyroid Transplantation.—The permanent results of thyroid transplantation were given by Kocher, of Berne, at the German Congress of Surgery, 1914. He had treated 93 cases and had good results in all save 18. Transplantation was made into the bone-marrow, peritoneum, spleen, and other organs, those into the spleen being most successful. The pieces of thyroid were best taken from the gland taken from patients with exophthalmic goitre, because in these thyroïd activity is most marked.

Payr, of Berne (*Jour. Am. Med. Assn.*, June 6, 1914, p. 1822), reported an astonishing improvement, lasting two years and four months, following the transplantation of a piece of the mother's thyroid into the daughter, who had congenital lack of the thyroid and was a complete idiot. Three other cases gave satisfactory results. Kocher, also quoted, says that no success has hitherto been obtained by means of homotransplantation. Streda, another operator quoted, reported remarkable improvement in three cretin cases after the implantation of thyroid tissue.

THE HANDS IN MULTIPLE AETHRITIS

It is common knowledge that deformities persist and progress in the hands of polyarthritics, generally because inaction is preferred to painful motion, but G. R. Elliott (*N. Y. Med. Jour.*, Nov. 14, 1914, p. 957) gives, as the result of many operations, good evidence that the deformities, if operated on only when active disease has been arrested and where proper after-care is given, have the primary etiological factor eliminated and regain manual power. Most deformities can be reduced by forcible reduction and open operation combined. The reduction can be done under profound ether or chloroform narcosis, gas being contra-indicated. The fingers are taken singly, the contraction or hyperextension forcibly broken down, and, if the

fingers are contracted, these are forcibly hyperextended. Some deformities necessitate a cutting operation. When this is required, they should be cut before reduction is made. Cases operated on have remained well after two or three years.

BONE CAVITIES AND LIME SALTS

After long experimental work and one clinical experience, Marcozzi (*Riforma Med.*, No. 19, 1914) asserts the excellence of lime salts in filling the bone cavity. He mixes equal parts of calcium carbonate and phosphate, sterilizing it by dry heat, or adding water and boiling until evaporation has begun. A tincture of iodine is lightly applied to the cavity, then the mixture, smoothed out with a Volkmann spoon, is shovelled into the cavity, where it arrests bleeding. There are great advantages in this method of filling up bone cavities with material which will not act as a culture medium or foreign body and which is easily absorbed.

FRACTURES

Building up Fractures.—The building up or reinforcement of land where slides are possible is extensively done by means of an enormous squirt which propels fine gravel and concrete, but H. J. Kauffer, of New York (*N. Y. Med. Jour.*, Nov. 21, 1914, p. 1013), is using homogeneously granulated bone mixed with petrolatum to inject into and between fractured ends of bone. He finds it hastens repair, especially in delayed union: it encourages calcareous deposits and a metaplasia of the adjacent tissue cells.

The piece of *fresh* bone, dried and pulverized, is mixed with petrolatum into a paste; sterilized by placing in a large bottle, which is placed up to the neck in water and boiled for two hours. When required, it is warmed, shaken, and injected by a 4 or 8 Cc. needle with a bore about gauge 20, which is passed as deep as possible between the fractured ends and the contents injected as the needle is slowly withdrawn to the surface of the bone, when injecting must be stopped. This procedure can be repeated from several angles if necessary.

MALIGNANT BONE TUMORS

To avoid resection of the bone after amputation for malignant tumors, R. Wenglowski (*Lancet*, May 16, 1914, p. 1391) sterilizes the bone, so killing all the elements of the tumor, and allows the dead

bone to remain. After the sterilization it exactly resembles the dead bone inserted after a resection. This method means a complete and natural connection which cannot be produced by the most ingenious operation.

HIGH TEMPERATURE IN MALIGNANT TUMORS

The presence of continued high temperature in malignant tumors has not received sufficient mention from clinicians. Dr. John Philips describes a case of adenosarcoma of the kidney, with continued elevation of temperature, and gives a *résumé* of the literature (*Amer. Jr. Med. Sci.*, February, 1915). The great variations of temperature in the febrile cases may be considered typical, just as we associate the hectic type with suppuration or tuberculosis. It would seem that the most reasonable cause of the fever is the entrance into the circulation of small amounts of products of autolysis. Probable as this may seem, no such substances have been isolated nor their presence proved.

RESTORATION OF BLADDER

R. Gregoire (*Journal d'Urologie*, Paris, July 15, 1914) thinks a case he reports is the first to be published. A new bladder was made from the rectum for extensive destruction of the vesicovaginal wall without exstrophy or cancer of the bladder. In this and four other cases continence of urine was not secured, but otherwise the results of the operation were satisfactory.

HEART SURGERY

Surgical intervention has been endorsed by Alexis Carrel and T. Tuffier (*Med. Presse and Circular*, 1914, cxlviii, p. 530) as likely to give benefit in pure mitral stenosis, certain aortic stenosis, and, in some, in the pulmonary artery. In operation the chief dangers are wounds of the coronary arteries, hemorrhage, entrance of air into cavities, and thrombosis. Wounds near the origin of the artery, even needle pricks, always cause momentary arrest of the heart's action, followed by a relatively prolonged arrhythmia. Central application of a ligature is always fatal; the heart is arrested in diastole and resuscitation is impossible. When preparing to operate, the circulation must be almost completely interrupted. The arterial pedicle—pulmonary artery and aorta—may be compressed not longer

than 45 seconds, because of the great dilatation of the right heart. Although simultaneous compression of the pulmonary veins produces death after some minutes, owing to deoxygenation of the cardiac muscles, individual forcipal pressure of these vessels is not attended with danger.

PYLORIC STENOSIS IN INFANCY

Pyloric stenosis in infants is ably discussed by L. Emmett Holt in *Journal of the American Medical Association*, June 27. It is seldom seen in the first week of life, nearly always occurs in the breast-fed, nearly always in males. Onset, in the first week of life, of projectile vomiting is presumptive evidence against the diagnosis in question. Both spasm and hypertrophy of the circular bands at the pylorus are probably present in each case, their relative prominence varying, of course, and the treatment advocated depending, not on that question, but on the result of medical treatment for a few days or longer. If a persistent, daily loss of weight goes on, the treatment must be an operation. Many cases, on the contrary, show an improvement when treated by gastric lavage, with water at about 112° F., careful feeding, etc. A temporary pyloric spasm may be induced by many conditions, but definite, persistent spasm of the pylorus without hypertrophy is yet to be proved. Visible peristaltic waves he regards as the most important symptom in making a diagnosis. They can always be found when properly sought for, and the author would not be willing to make a positive diagnosis in their absence.

The vomiting does not include attacks in which small amounts are lost, occasionally, but the entire contents of the stomach, projected, possibly, four or five feet, and commencing often before feeding is completed. In those cases that recover from this condition without operative interference the cure appears to be a complete one.

The subsequent history shows no more digestive weakness than the average healthy child would under similar circumstances.

Among important diagnostic means is that of feeding a measured amount of food, then, about three hours later, emptying the stomach, preferably by means of the Hess apparatus for duodenal aspiration, as the ordinary gastric lavage apparatus is unsuitable. In some cases vomiting occurs only at relatively long intervals, and, the ob-

struction being almost absolute, the stomach will contain more than one feeding.

This is of much more value than the X-ray. Constipation may not be marked, as some food may pass, although the pyloric opening be very small. There is usually a marked reduction in the urine, and with complete obstruction there may be anuria for twenty-four hours or more. Under such circumstances, a renal disorder may be diagnosed, the vomiting being attributed to it.

In the same number William A. Downes has an article on pyloric obstruction, and reports twenty-two personal cases with operation. He agrees with the teaching of Dr. Holt as given above, but was able to demonstrate a pyloric tumor in every case excepting one before operating, and in the one exception noted was able to find it when the patient was under ether. Peristaltic waves are always present, but these occur also in other conditions. They, therefore, are not pathognomonic. The author thinks that every case of this disorder should be operated so soon as diagnosed.

OÖPHORECTOMY AND POSTOPERATIVE CONDITIONS

It has to be remembered that in oophorectomy there is taken away from woman the ability to form the internal secretion of the ovary which assists in oxygenation and metabolic processes. A. Gordon (*Jour. Amer. Med. Assn.*, Oct. 17, 1914, p. 1345) also draws attention to the fact that individuals presenting psychoneuroses before operation had their psychic phenomena decidedly aggravated after the uteri and ovaries or only ovaries were removed. A far greater caution in operative procedure on the generative organs is necessary. Frank R. Starkey, W. N. Leszynsky, and R. T. Morris agreed that they only found psychic disturbances when they had existed previous to operation.

THE RARE VESALANIUM

It has been pointed out by W. P. Coues (*Boston Med. and Surg. Jour.*, May 7, 1914) that a radiogram of the metatarsal bone on both sides should be taken when fracture has occurred through the base of the fifth metatarsal bone, because that very rare abnormality—the vesalanium—may exist and be mistaken for a fracture. It corresponds to a bone of the same name in the hand, and is a proximal and external part of the tuberosity of the fifth metatarsal and undescribed by modern anatomical writers.

THROMBOPHLEBITIS OF THE SIGMOID SINUS

When the symptoms of suppurating otitis are present, every physician and every surgeon may be expected to remember the possibility of thrombophlebitis if the patient appear seriously ill. Edward I. Meierhof (*Jour. Am. Med. Assn.*, Oct. 17) draws attention to the necessity of examining the ear in all cases of unexplained high temperature, or cases which, while not extremely high, show the curve of pyæmia. Many conditions may be simulated, but, if the cause cannot be found, an inflammation of the ear, either acute or chronic, even if not apparently of severe grade, should lead to seriously considering opening the mastoid. Illustrative cases are given.

OPERATIONS ON THE GALL-BLADDER AND THE STOMACH

"Anoxic-association" is the subject of a paper by Dr. George Crile, in which he states that the result of laboratory investigation made to determine the cause of postoperative morbidity has shown it to be acidosis (the increased saturation of the blood with hydrogen ions). This is induced by exhaustion of all kinds, and prominent mention is made of ether, insomnia, fear, infection, and pain. The effect is evident in liver, brain, and adrenals, and in them only. Among valuable aids Dr. Crile mentions a competent, tactful nurse after the operation. The article and its discussion should be read in full.—(*Jour. Am. Med. Assn.*, Oct. 17.)

The Cosmetic-damaged Skin.—The universal use of paint and powder brings many patients to the dermatologists, suffering from rough or abraded skin areas, often ending in severe eczema. Two components are lacking in these areas, oil and water. The horny cells take up the water, which renders them soft, while oil covers them and hinders evaporation. Kromayer (*Deutsch. med. Woch.*, Sept. 4, 1914) recommends first washing the face and then applying the following, which ointment he also recommends to doctors who have so frequently to wash their hands:

B.—Lanolini.	
Eucerini	aa20.0.
Aq. distill.	40.0-80.0.
Paraffini liq.	
Glycerini optimi }	aa10.0-20.0.
M.	

The Use of Fat in Surgery.—Binnie (*Surg., Gyn. and Obst.*, March, 1914) notices that, in spite of the reputation of fat as a tissue of poor resisting power, it is well suited for transplantation. The omental plug becomes adherent to the raw surface, prevents hemorrhage, and is ultimately converted into fibrous tissue. The tissue for transplantation should be obtained from the patient. He mentions the work of Chaput and Makas in obliterating bone cavities with masses of fat, and of Tuffier in grafting large masses of fat between the parietal pleura and ribs in bronchiectasis.

SPINAL ANÆSTHESIA

Operations with a High Mortality.—Most authors concur in contra-indicating it in pronounced kyphoscoliosis and pressure points along the spinous processes which might indicate abnormal conditions within the arachnoidal sac, such as adhesions, or lack of cerebrospinal fluid, diseases of the central nervous system, profound shock, marked hypotension from other causes, sepsis, and fevers of unknown origin; also in neuropaths and where there is a strong objection to the process. Syphilis is no longer a contra-indication.

Spinal Anæsthesia in Gynaecology.—It has been proved that spinal anæsthesia is less dangerous than ether, and should be employed in cases not complicated by other organic or systemic disturbances. George Gellhorn (*Surg., Gyn. and Obst.*, October, 1914, p. 492) gives his experience in 150 cases, where he failed to get complete anæsthesia in only three. Krönig had to add chloroform or ether in 1127 out of 2140 gynaecologic operations. Sellheim, in 1000, had a percentage of 86.1 of undisturbed anæsthesia. Doederlein and Krönig prefer the spinal method because it is a form of local anæsthesia in which the poison is deposited round the site of injection and does not enter the system. Patients with heart or lung trouble, kidney disease, or diabetes bear it better than narcosis. F. Allen and W. W. Babcock and many others use the spinal route in all

Cranectomy.—Two French surgeons, M. M. Sicard and Hague-neau, have found that in every case where an exploratory or decompressive craniectomy was indicated local anæsthesia was sufficient; even lateral craniectomies of the temporal were so accomplished.

Härtel also (*Arch. f. klin. Clin.*, 1913, No. 1) reported 27 successful cases of operation on the head under local anæsthesia, but has

now gone further and blocked the gasserian ganglion for anaesthetic purposes in cranial operations. There was some pain in six resections of the upper jaw, and he recommends a previous injection of morphine, blocking of both ganglia, and anaemic injection of the field with novocaine-suprarenin.—(*Med. Times*, July, 1914, p. 230.)

Difficulties and Dangers in Aural Exploration.—Why the simple operation of exploratory puncture and insufflation in the ear, or even syringing of the antrum, should often produce convulsions, apoplexy, epilepsy, hemiplegia, dyspnoea, rigors, syncope, and even death, is ably discussed by A. Brown Kelly in the *Journal of Laryngology, Rhinology and Otology*, December, 1914. He gives nine fatal cases, and groups the other cases, ascribing, as causes, faults in technic, anatomical abnormalities, temperament of patient, local anaesthetic, air embolus, spasm of cerebral arteries, and reflex irritation of vagus, though he admits there is great obscurity in the whole matter of otological accidents. The similarity of those caused by antral and pleural puncture is touched on, and, "as the latter are more common, they will probably be the first to afford a solution of the problem."

BLOOD POISONING

The gravity of an infection, especially to a tired surgeon who has little power of resistance, is not sufficiently taken into account when the accident occurs. It may manifest itself in three forms: lymphangitis, tenosynovitis, and abscesses in the fascial spaces, as noted by W. B. Brinsmade (*N. Y. State Jour. of Med.*, July, 1914, p. 348), who advocates the following treatment in all cases, even though seemingly slight:

When an anatomical diagnosis cannot at once be made, cover the point of injury with tincture of iodine, put the patient to bed, give a saline cathartic, encase the limb on a splint in a generous, hot, moist, antiseptic dressing so arranged that it can be changed frequently: boracic acid in saturated solution is best. The limb is again examined in six hours, with the possible involvement of a tendon sheath always in mind. Patients treated by these means, *resorted to at once*, are often well in some 36 hours. There should be no squeezing or manipulation of the swollen tissues.

When a satisfactory diagnosis of tenosynovitis has been made, immediate operation should be done: abscesses in the fascial spaces

should be freely opened, with the anatomy of the hand always in mind. Bread and flaxseed poultices and carbolic acid are more injurious than healing. In lymphangitis an operation under ether should be made so soon as the presence of pus is detected, with a liberal incision along anatomical lines to where the pus has collected.

It is useless to suck a little wound: this only means a negative atmospheric pressure of 15 pounds per inch.

APPENDICITIS

Little has been added to our methods of diagnosis. Mortality without operation is 20 per cent., and, with it, less than 5 per cent. Dr. J. M. T. Finney thinks mortality in appendicitis preventable, death an evidence of a mistake, and pus of a blunder on the part of somebody, not always the physician or surgeon.—(*N. Y. Med. Jour.*, June 27, 1914, p. 1309.)

Chronic Appendicitis.—Chronic appendicitis is gradually receiving its deserved attention as the explanation of many an obscure pain and of many a "chronic dyspepsia," but we have need at times of every diagnostic point that we can bring to our aid to determine its presence or absence. Ernest H. Goodman, University of Pennsylvania, and Charles W. Luders, of Cynwyd, have made a study of Bastedo's method of inflating the colon in cases suspected of being chronic appendicitis. When the test is positive, inflation of the colon with air causes, at McBurney's point, a distinct tenderness, aggravated by finger-point pressure. In cases where there has been previous complaint of epigastric pain, pressure over the inflated cæcum causes pain, not at McBurney's point, but in the epigastrium. The test did not prove infallible, but is of great value used in conjunction with others. It is applicable only to cases that are not acutely inflamed.—(*Amer. Jour. Med. Sci.*, September, 1914.)

GASTRO-INTESTINAL DISEASE

William J. Mayo (*Med. Record*, Oct. 3, 1914, p. 604) reminds the medical world that an estimate of the curability of any gastro-intestinal disease based on data gathered more than five years ago is practically worthless. Simple ulcers were imagined to occur in the stomach in 95 per cent. Now it is known 75 per cent. are in the duodenum. There is absolute truth in asserting that 98 per cent.

with duodenal ulcer and 95 per cent. with gastric ulcer may be cured by a well-chosen, well-executed operation. Resection of the stomach for cancer gives about 25 per cent. of five-year cures, with an operative mortality of 10 per cent. Operation for cancer of the large intestine has resulted in 50 per cent. of such patients living five years longer and being apparently well at the end of that time. Short-circuiting the ileum into the sigmoid and removal of the large intestine for degenerative and neurasthenic conditions is being practised. The removal of gall-stones has only a small mortality, and when the gall-bladder is too diseased to functionate it should be removed, for, in early operation, cancer of the gall-bladder and liver may be obviated.

SPLENECTOMY

Reviewing the results of modern surgery, Michelsson (*Ergeb. der Chir. und Orthopäd.*, Bd. vi, 1914) says that the organ may be removed without any ill effects. Leucocytosis follows extirpation and lasts a long time, but other disorders which have been described as following splenectomy are not specific and are transitory. Injury is the chief indication for operation.

Splenectomy and Anæmia.—At the British Medical Association Meeting (1914) J. S. McKendrick advocated the removal of the spleen in certain forms of anæmia. This organ had, at any rate, been shown to be non-essential to life. William Ogler stated that rapid enlargement of the liver occurring in the course of splenic leukæmia with splenomegaly usually indicated splenectomy. Sidney Boyd also advocated splenectomy in treatment of uncomplicated splenic anæmia. L. P. Phillips reported an apparent cure of splenomedullary leukæmia by benzol, but advised care in the use of the drug, as it was a strong poison.

Extirpation of the Spleen for Diseases of the Blood.—At the Surgical Clinic of Professor Van Eiselburg, Vienna, twenty extirpations of the spleen were made for haemolytic icterus, pernicious anæmia, Banti's disease, and hypertrophic cirrhosis of liver, and thrombophlebitic forms, sixteen being very successful and four dying (shock, ileus of duodenum, two pneumonia).

Dr. J. M. T. Finney has operated on three cases: all made excellent recoveries, and one had a double spleen.—(*Annals of Surgery*, July, 1914, p. 133.)

Egyptian Splenomegaly.—Professor Owen Richards, of Cairo (*Lancet*, March 7, 1914, p. 696), writes of a form of enlarged spleen peculiar to the country and which he calls "Egyptian splenomegaly." In twenty-two patients the average weight of the excised spleen was about three pounds. The clinical features of the malady range it with Banti's disease, but it has features which differentiate it from all other forms.

Ocular Compression in Diagnosis and Therapeutics.—The involuntary compression of the eyeballs when worried or tired has been found to have therapeutic value. Loeper and Weill (*Bull. et Mem. de la Soc. Méd. des Hop.*, April 9, 1914) were impressed with the readiness with which morbid phenomena could thus be awakened, and studied the subject as a remedial agent. They found pharyngeal and pharyngolaryngeal spasm, vertigo and tinnitus could be stopped for a time, also the spasm of asthma and hiccough, sneezing and yawning, the peripheral excitation being received through the sensory terminals of the fifth pair of nerves.

COCCYGODYNIA

Frank C. Yeomans (*Southern Practitioner*, September, 1914, p. 398) reports prompt and complete relief in seven cases by following the suggestion of Schlosser of injecting 70 to 80 per cent. alcohol in sensory nerves, thereby causing their degeneration. The prognosis is better in traumatic than in neuralgic cases.

ECLAMPSIA

O. Vertes has expressed a belief that eclampsia is a manifestation of anaphylactic shock produced by the absorption of chorionic villi during pregnancy (*Monat. f. Geburt. u. Gyn.*, October, 1914), and he regards the albuminuria of pregnancy as a premonitory stage of eclampsia. In a series of experiments he has shown that animals can be sensitized by their own albumin, as well as by foreign. The symptoms are practically identical to eclampsia, and the post-mortem changes are also identical in patients and animals.

THE LINGUAL TONSIL

Until the last few years the lingual tonsil received very scant attention in literature or in practice, but recently several writers have drawn our attention to the fact that it is, clinically, an organ of

very great importance, and have noted the fact that many obstinate coughs, attacks of persistent morning nausea, throat irritation attributed to an elongated uvula, but not relieved by treating the latter, are really due to overgrowth of this mass of tissue near the epiglottis. In the *Pennsylvania Medical Journal*, August, 1914, William H. Hitschler has a most practical paper on this subject, and, since other writers are drawing attention to it, we may expect this tissue to share the popularity of the faucial tonsils and adenoids, among the public, at least. There can be no manner of doubt that many an unexplained "neurosis" will disappear if Dr. Hitschler's article is given the attention which it merits and his suggestions about palliative and operative treatment are followed. Application of glycerol of tannin, solution of nitrate of silver, trichloracetic acid, or of the electric cautery will suffice in most cases. Some require removal of the tonsil, and there are several methods of choice. Needless to say, no application may be made without watching the applicator through the laryngoscope to avoid entering the larynx, and, for the same reason, there must be no excess of fluid on the applicator.

ZONE THERAPY

At the fiftieth annual meeting of the Connecticut State Dental Association, held April 22, 1914, Dr. W. H. Fitzgerald, of Hartford, Conn., has this to say about his new method of producing analgesia and anaesthesia:

In zone therapy we divide the body longitudinally into ten zones, five on each side, and including the median line. The first, second, third, fourth, and fifth zones begin in the toes and end in the thumbs and fingers, or *vice versa*. The first zone extends from the great toe up the entire height of the body from front to back, across the chest and back and down the arm into the thumb, or *vice versa*. Pain in any part of the first zone may be treated and overcome temporarily at least—and often permanently—by pressure over the first joint of the great toe, or the corresponding joint of the thumb. Should the pressure be limited to the upper surface of the great toe, the anaesthetic or analgesic effect will extend up the front of the body to the frontoparietal suture, also across the chest and down the anterior surface of the first zone of the arm and thumb, and often the thumb side of the index-finger. Should pressure be made on the under surface of the great toe, the effect will extend along the first zone in the sole of the foot, and up the back of the leg, thigh, body, and head in that zone to the above-named suture; also across the back and down the posterior surface of the first zone of the arm and thumb, and often the thumb side of the index-finger. Pressure on the end of the great toe or the tip of the thumb will affect the entire

first zone. Lateral pressure on thumbs and fingers or toes will affect the lateral boundaries of zones. A limited amount of anaesthesia may be established by pressure over any resistant bony surface in this zone, and often the mere momentary contact with the galvano-cautery or with a sharp-pointed instrument, or pressure with the thumb-nail or finger-nail, will produce the same result. Pain anywhere in this zone may be overcome more quickly by pressure with an applicator or with cautery contacts at certain points throughout the first zone in the mouth, pharynx, epipharynx, and nose, but the finger and toe pressures may be relied upon very often, and what applies to one zone applies to all. Pressures average from one-half minute to four minutes, depending upon the susceptibility of the patient. Contacts should be momentary but manifold. If, for example, the patient has pain in the first zone on the left side of the jaw—upper and lower—it is overcome, temporarily at least, by firm pressure on the great toe or thumb. The patient may exert this pressure himself, but the operator or an assistant will do it more expeditiously. This pressure may have anaesthetized the incisor region sufficiently for the painless extraction of the left incisor and cuspid. However, it is usually necessary to supplement this pressure, for operative interference, by pressure on the lips and at various points of the jaws. The first, thumb or great toe, zone on the left side, for instance, usually includes the left incisor and canine. Occasionally the second zone includes the cuspid, although as a rule it includes but the bicuspids. The third zone includes the two molars, and the inner side of the fourth zone the third molar. Pressure with the thumb and index-finger or cautery contacts on the upper or lower jaws in any of these zones will relieve pain in any part of an individual zone. Pressure or cautery contacts on the anterior surface of the jaws controls the anterior sections of zones one, two, three, and four, and pressure or the application of cautery contacts on the posterior surface of the jaws controls the posterior sections of the above zones. Pressure with the thumb or finger on the inferior dental and lingual nerves at the inferior dental foramen will anaesthetize that half of the jaw, and, to a greater or less extent, the entire half of the body on the side compressed, and because of the anastomosis of nerves at the median line of the jaw, this pressure occasionally causes an anaesthesia of a part or even the whole of the opposite side of the jaw. But this is the only instance thus far noticed where anaesthesia through pressure crosses the median line of the head or body.

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